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Hosomi et al.

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(54) **INFORMATION PROCESSING APPARATUS, INFORMATION PROCESSING METHOD, AND RECORDING MEDIUM FOR CONVERSION OF VENDOR-SPECIFIC PRINT DATA**

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(73) Assignee: **Ricoh Company, Ltd.**, Tokyo (JP)

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G06F 3/12 (2006.01)
G06K 15/02 (2006.01)

(52) **U.S. Cl.**
CPC ***G06K 15/181*** (2013.01); ***G06K 15/1806*** (2013.01)

(58) **Field of Classification Search**
CPC G06K 15/181; G06K 15/1806; G06K 15/1815
See application file for complete search history.

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Primary Examiner — Benjamin O Dulaney
(74) *Attorney, Agent, or Firm* — Duft Bornsen & Fettig LLP

(57) **ABSTRACT**

An information processing apparatus for generating drawing data by using a print job including print data and setting information, includes a description detection unit detecting a characteristic description included in the print data; a conversion unit converting the print data, the characteristic description, and the setting information into an instruction group; and one or more drawing data generation units generating the drawing data by executing the instruction group.

9 Claims, 26 Drawing Sheets

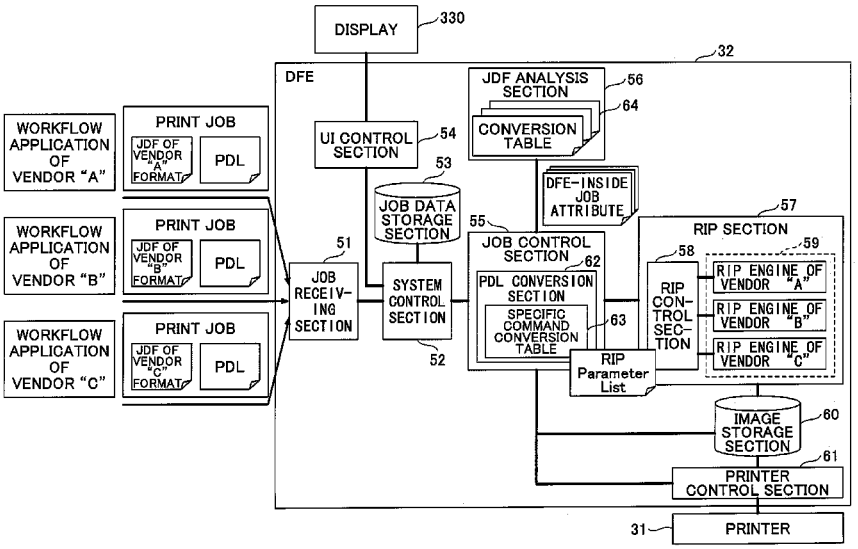


FIG.1A

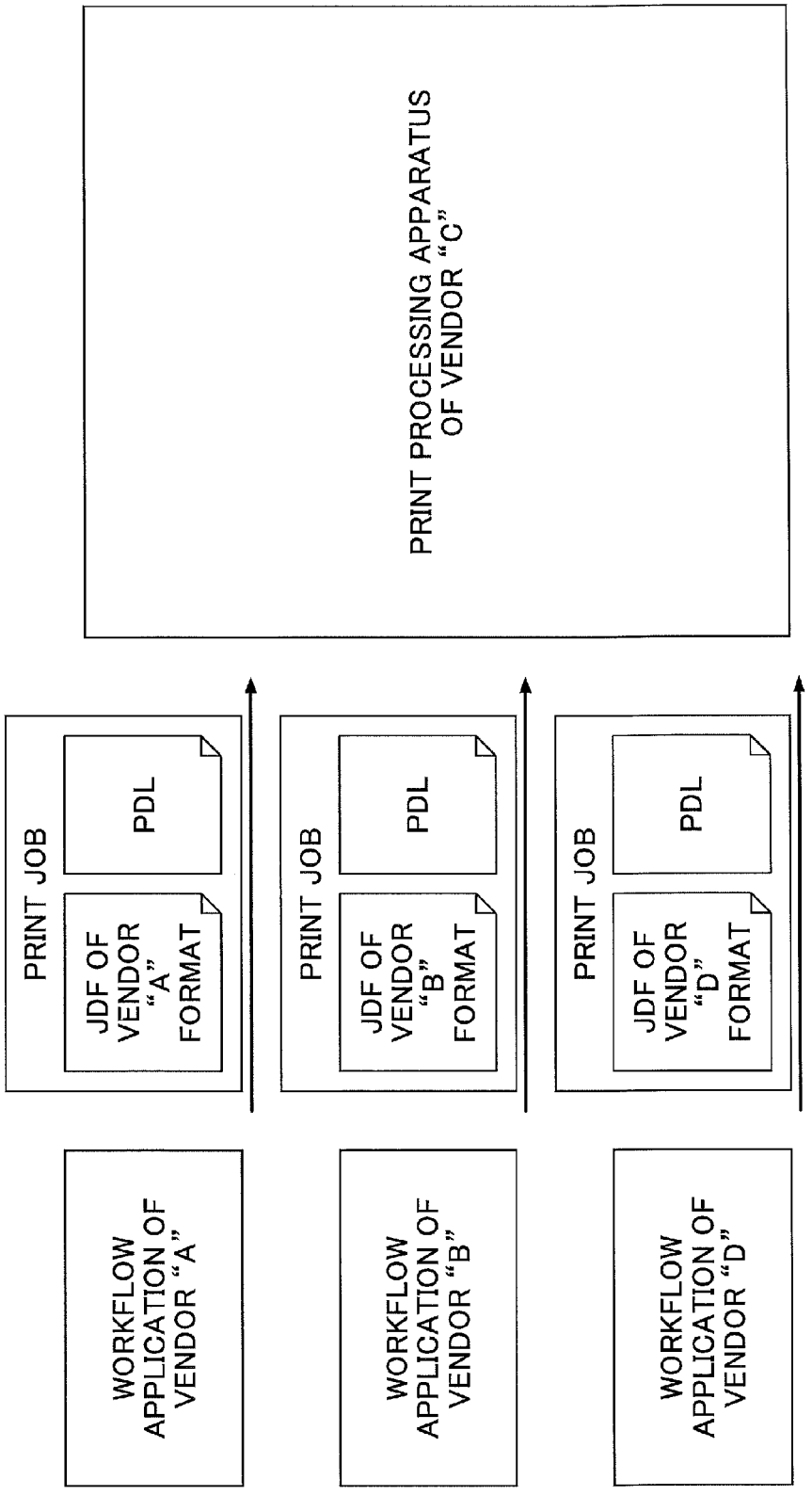

PRINT PROCESSING APPARATUS OF VENDOR "C"
PRINT JOB
JDF OF VENDOR "A" FORMAT
PDL
PRINT JOB
JDF OF VENDOR "B" FORMAT
PDL
PRINT JOB
JDF OF VENDOR "D" FORMAT
PDL
WORKFLOW APPLICATION OF VENDOR "A"
WORKFLOW APPLICATION OF VENDOR "B"
WORKFLOW APPLICATION OF VENDOR "D"

FIG.1B

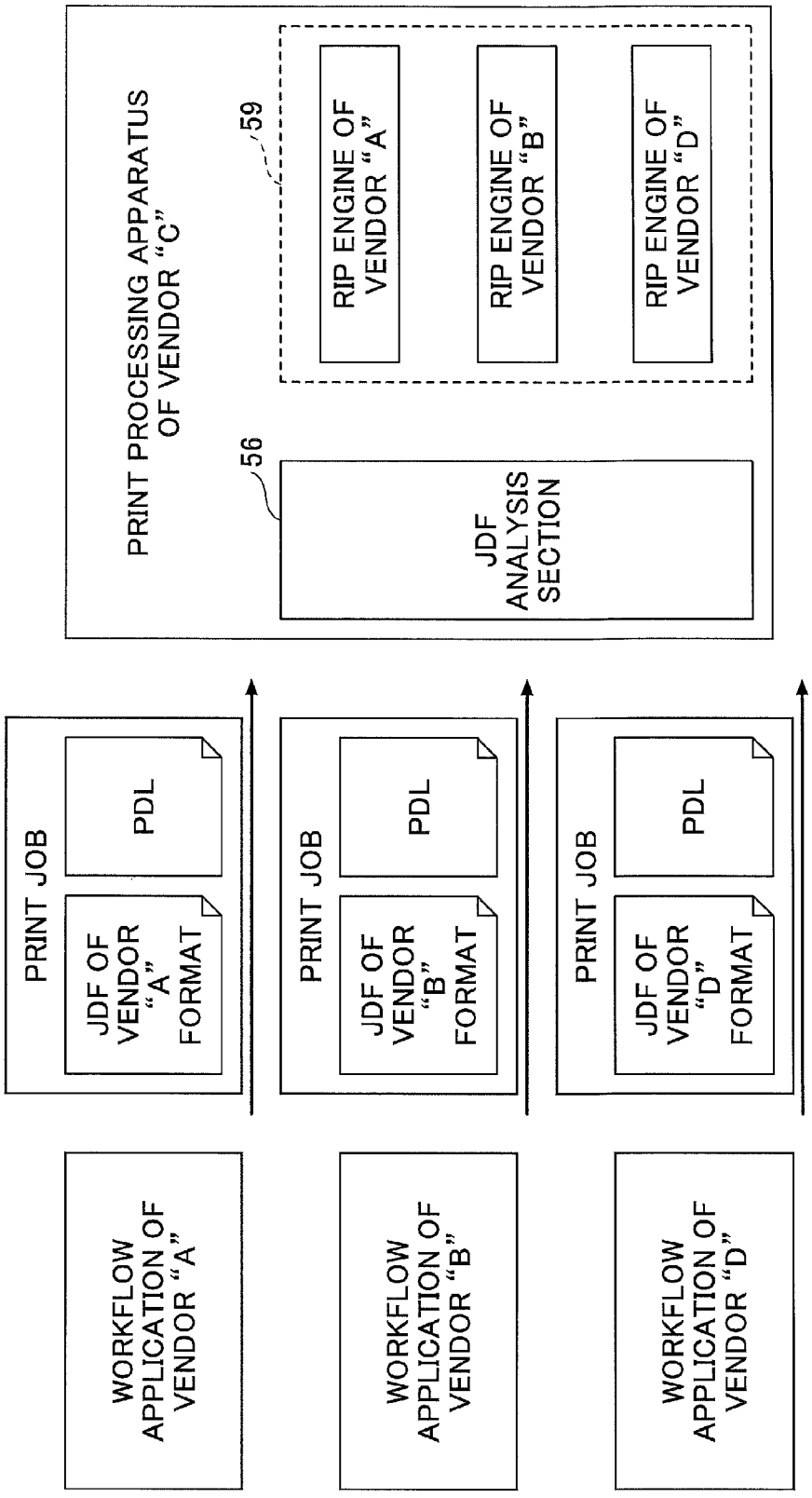

PRINT PROCESSING APPARATUS OF VENDOR "C"
59
RIP ENGINE OF VENDOR "A"
RIP ENGINE OF VENDOR "B"
RIP ENGINE OF VENDOR "D"
56
JDF ANALYSIS SECTION
PRINT JOB
JDF OF VENDOR "A" FORMAT
PDL
PRINT JOB
JDF OF VENDOR "B" FORMAT
PDL
PRINT JOB
JDF OF VENDOR "D" FORMAT
PDL
WORKFLOW APPLICATION OF VENDOR "A"
WORKFLOW APPLICATION OF VENDOR "B"
WORKFLOW APPLICATION OF VENDOR "D"

FIG.1C

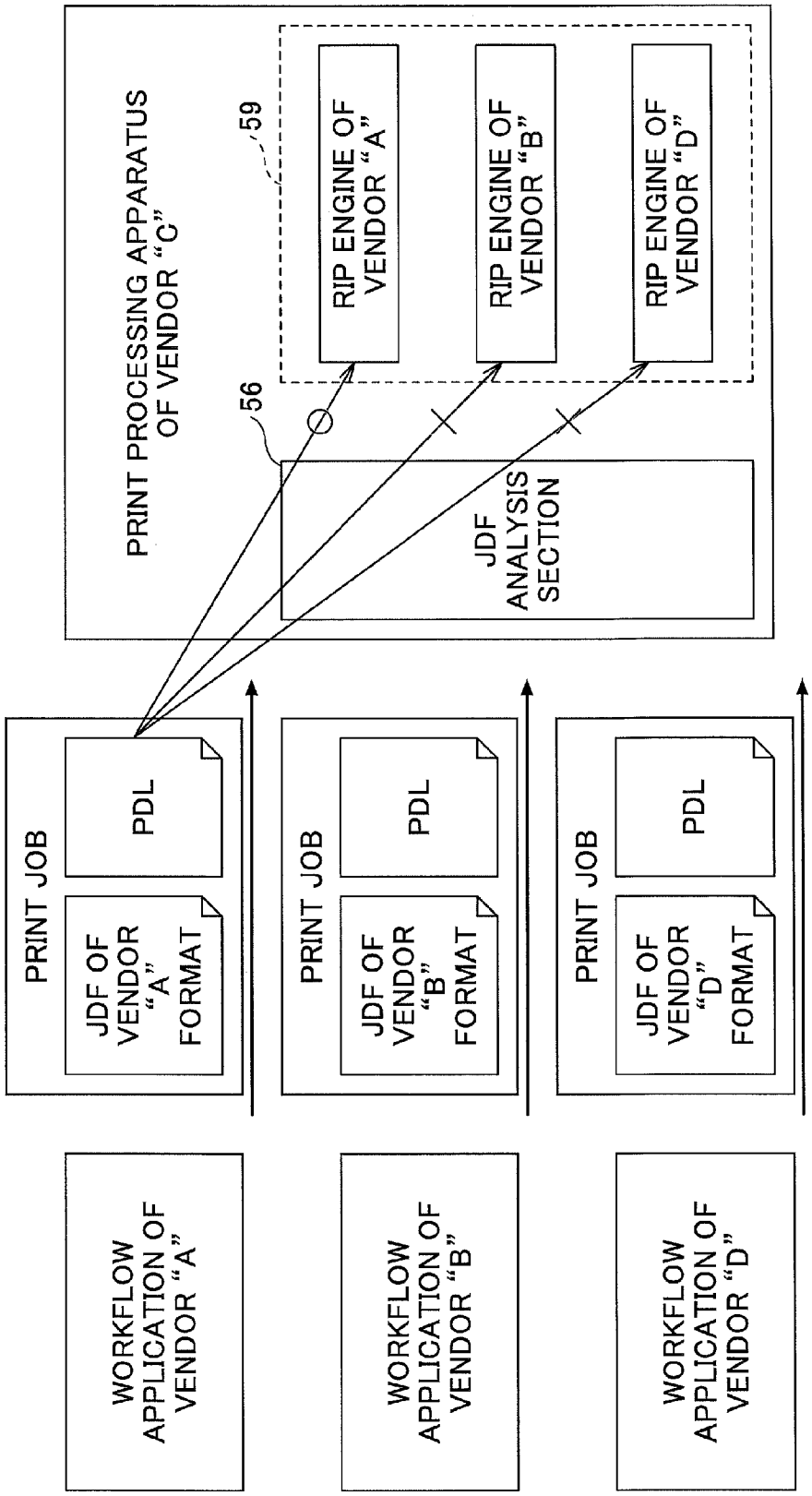

WORKFLOW APPLICATION OF VENDOR "A"
WORKFLOW APPLICATION OF VENDOR "B"
WORKFLOW APPLICATION OF VENDOR "D"
PRINT JOB
JDF OF VENDOR "A" FORMAT
PDL
PRINT JOB
JDF OF VENDOR "B" FORMAT
PDL
PRINT JOB
JDF OF VENDOR "D" FORMAT
PDL
PRINT PROCESSING APPARATUS OF VENDOR "C"
56
JDF ANALYSIS SECTION
59
RIP ENGINE OF VENDOR "A"
RIP ENGINE OF VENDOR "B"
RIP ENGINE OF VENDOR "D"

FIG.2A

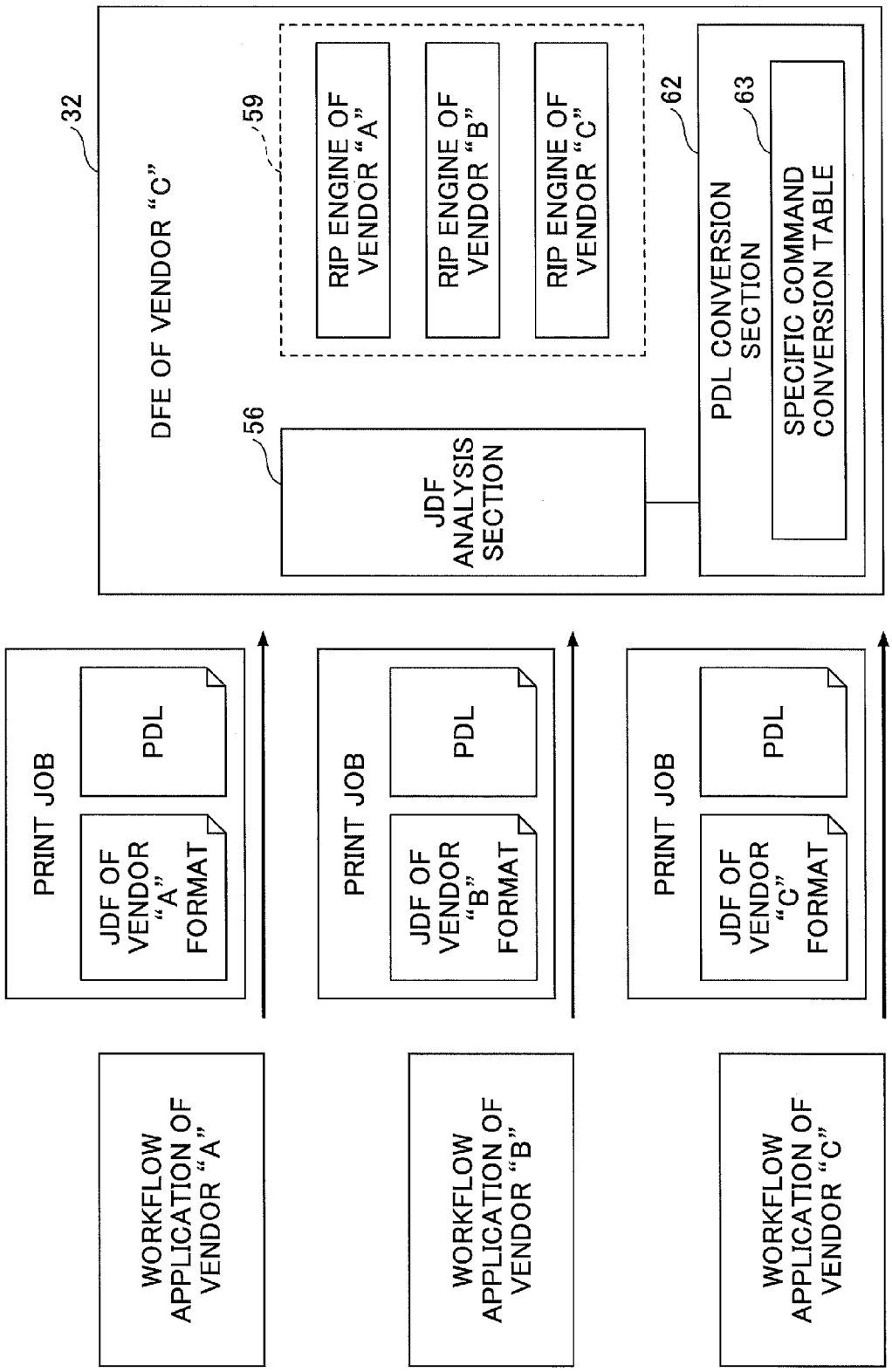

32
DFE OF VENDOR "C"
59
RIP ENGINE OF VENDOR "A"
RIP ENGINE OF VENDOR "B"
RIP ENGINE OF VENDOR "C"
56
JDF ANALYSIS SECTION
62
PDL CONVERSION SECTION
63
SPECIFIC COMMAND CONVERSION TABLE
PRINT JOB
JDF OF VENDOR "A" FORMAT
PDL
PRINT JOB
JDF OF VENDOR "B" FORMAT
PDL
PRINT JOB
JDF OF VENDOR "C" FORMAT
PDL
WORKFLOW APPLICATION OF VENDOR "A"
WORKFLOW APPLICATION OF VENDOR "B"
WORKFLOW APPLICATION OF VENDOR "C"

FIG.2B

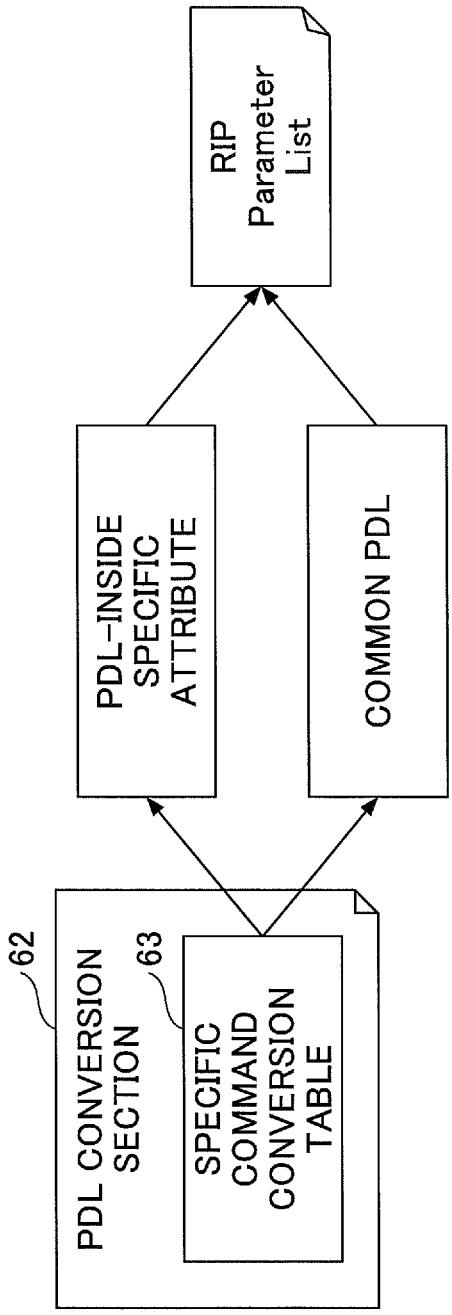

RIP
Parameter
List
PDL-INSIDE
SPECIFIC
ATTRIBUTE
COMMON PDL
62
PDL CONVERSION
SECTION
63
SPECIFIC
COMMAND
CONVERSION
TABLE

FIG.3

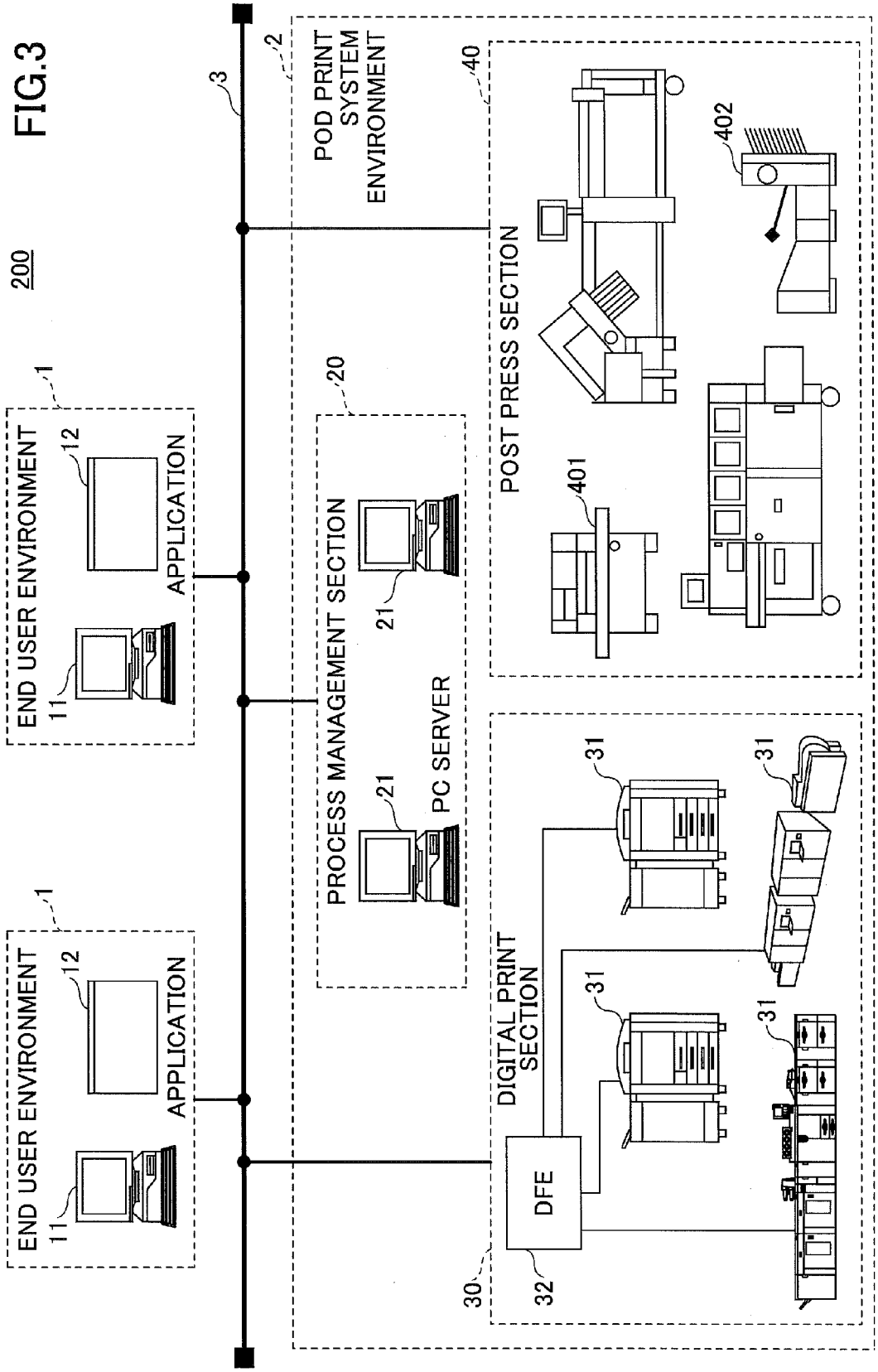
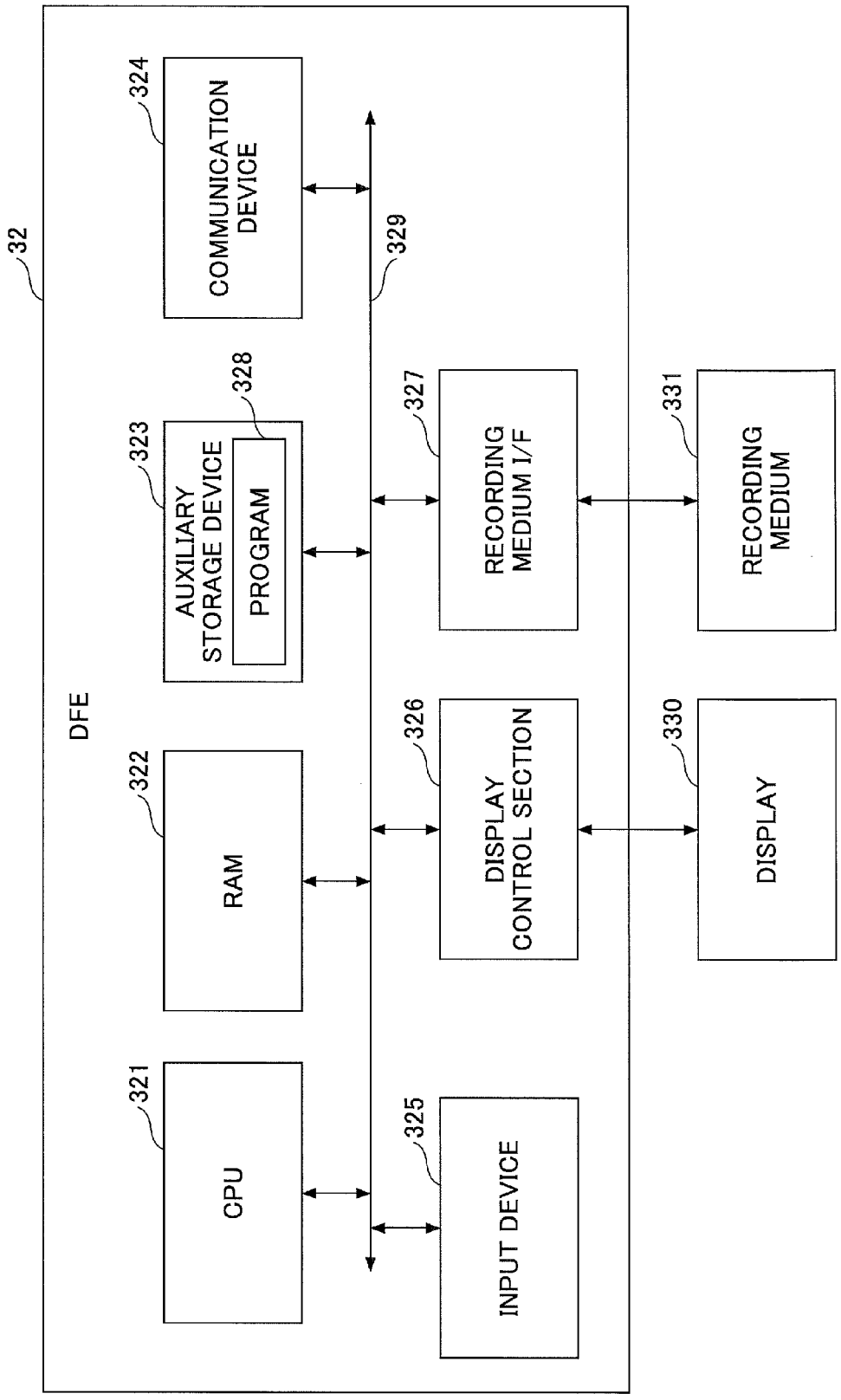

200
3
2
POD PRINT SYSTEM ENVIRONMENT
40
POST PRESS SECTION
402
401
20
PROCESS MANAGEMENT SECTION
21
PC SERVER
21
1
END USER ENVIRONMENT
12
APPLICATION
11
1
END USER ENVIRONMENT
12
APPLICATION
11
DIGITAL PRINT SECTION
31
31
31
31
DFE
32
30

FIG.4


32
DFE
324
COMMUNICATION DEVICE
329
323
AUXILIARY STORAGE DEVICE
328
PROGRAM
327
RECORDING MEDIUM I/F
331
RECORDING MEDIUM
322
RAM
326
DISPLAY CONTROL SECTION
330
DISPLAY
321
CPU
325
INPUT DEVICE

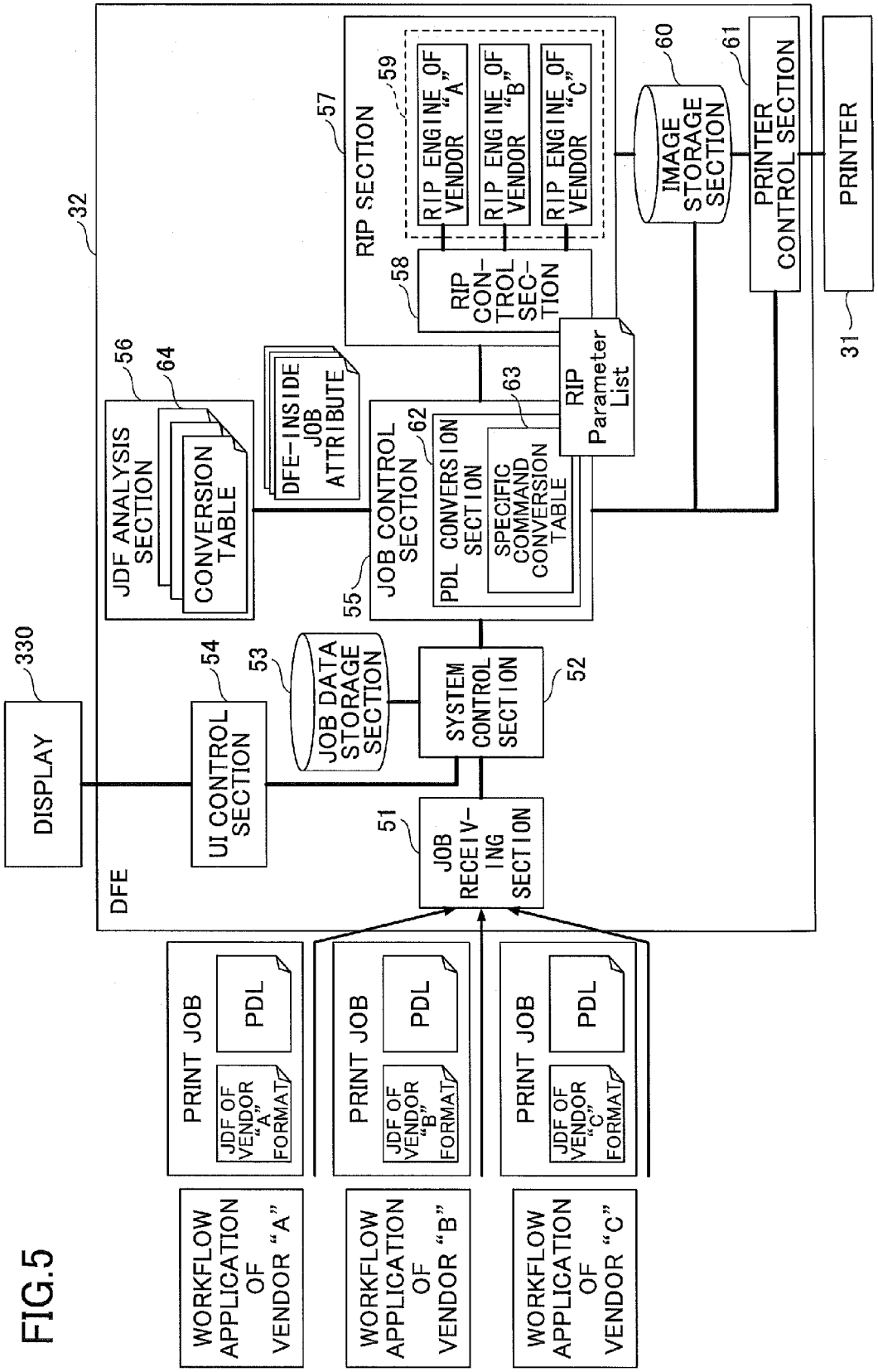

WORKFLOW APPLICATION OF VENDOR "A"
WORKFLOW APPLICATION OF VENDOR "B"
WORKFLOW APPLICATION OF VENDOR "C"
PRINT JOB
JDF OF VENDOR "A" FORMAT
PDL
PRINT JOB
JDF OF VENDOR "B" FORMAT
PDL
PRINT JOB
JDF OF VENDOR "C" FORMAT
PDL
DFE
32
DISPLAY
330
UI CONTROL SECTION
54
JOB DATA STORAGE SECTION
53
SYSTEM CONTROL SECTION
52
JOB RECEIV-ING SECTION
51
JDF ANALYSIS SECTION
56
CONVERSION TABLE
64
DFE-INSIDE JOB ATTRIBUTE
JOB CONTROL SECTION
55
PDL CONVERSION SECTION
62
SPECIFIC COMMAND CONVERSION TABLE
63
RIP Parameter List
RIP SECTION
57
RIP ENGINE OF VENDOR "A"
RIP ENGINE OF VENDOR "B"
RIP ENGINE OF VENDOR "C"
59
RIP CON-TROL SEC-TION
58
IMAGE STORAGE SECTION
60
PRINTER CONTROL SECTION
61
PRINTER
31

FIG.5

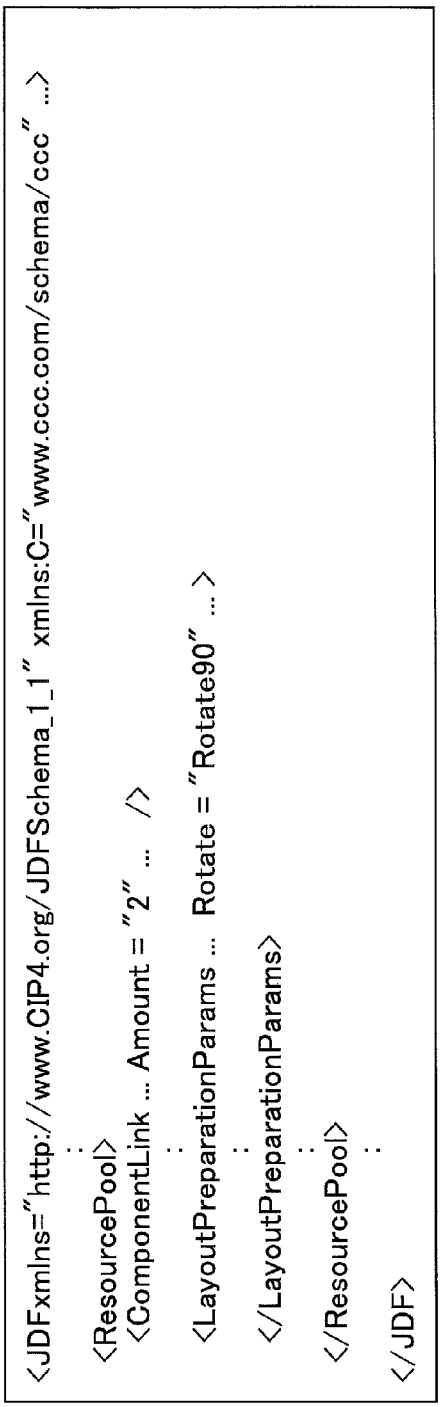

<JDFxmlns="http://www.CIP4.org/JDFSchema_1_1" xmlns:C="www.ccc.com/schema/ccc" ...>
<ResourcePool>
<ComponentLink ... Amount = "2" ... />
<LayoutPreparationParams ... Rotate = "Rotate90" ... >
</LayoutPreparationParams>
</ResourcePool>
</JDF>

FIG.6A

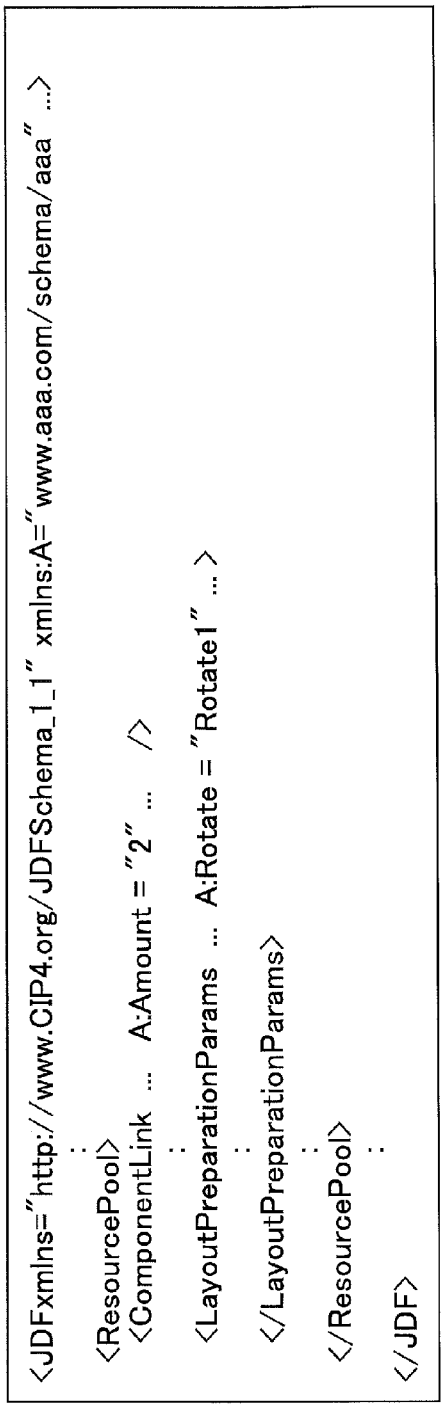

<JDFxmlns="http://www.CIP4.org/JDFSchema_1_1" xmlns:A="www.aaa.com/schema/aaa" ...>
<ResourcePool>
<ComponentLink ... A:Amount = "2" ... />
<LayoutPreparationParams ... A:Rotate = "Rotate1" ... >
</LayoutPreparationParams>
</ResourcePool>
</JDF>

FIG.6B

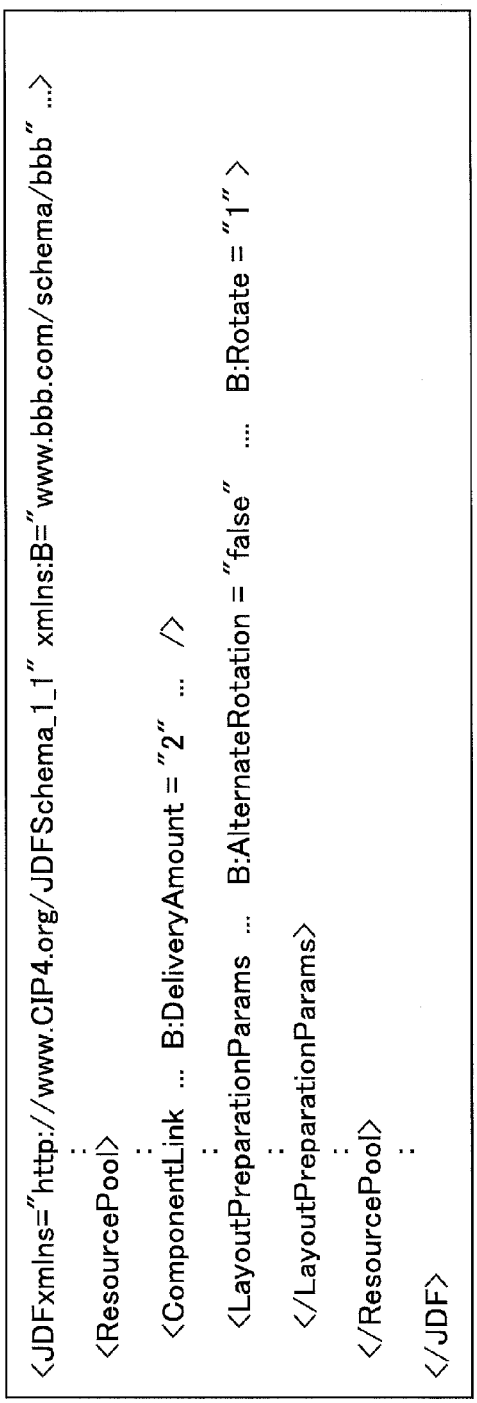

<JDFxmlns="http://www.CIP4.org/JDFSchema_1_1" xmlns:B="www.bbb.com/schema/bbb" ...>
:
<ResourcePool>
:
<ComponentLink ... B:DeliveryAmount = "2" ... />
:
<LayoutPreparationParams ... B:AlternateRotation = "false" .... B:Rotate = "1" >
:
</LayoutPreparationParams>
:
</ResourcePool>
:
</JDF>

FIG.6C

FIG.7A

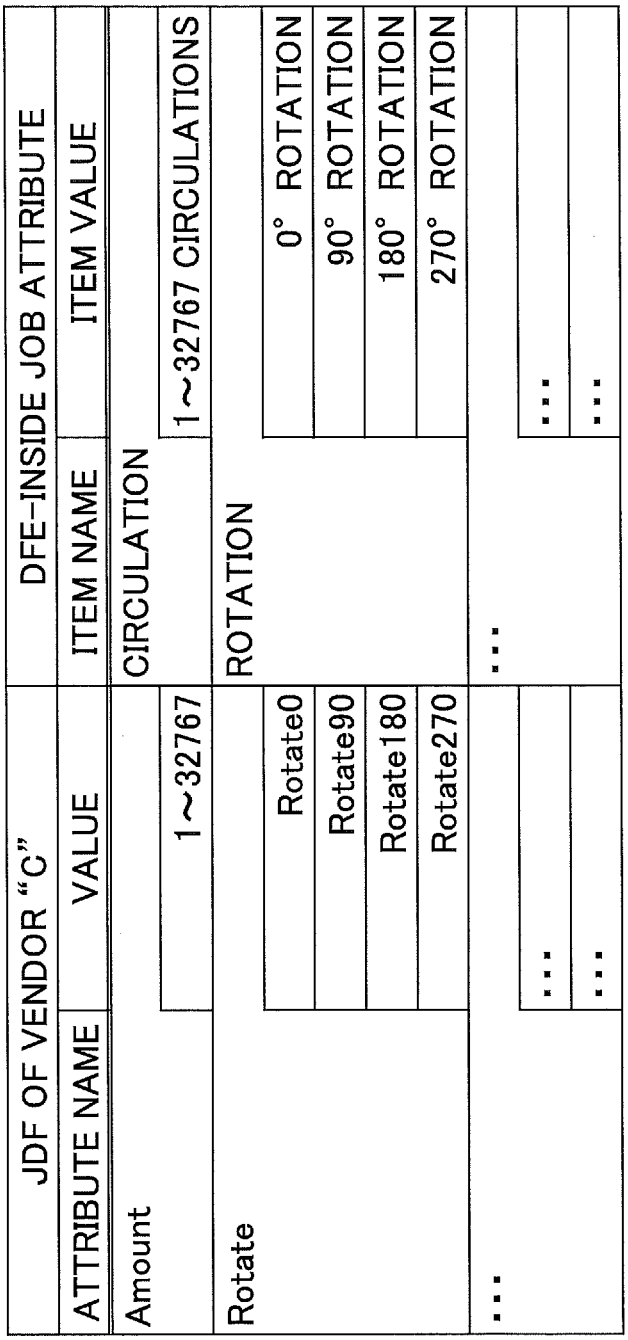

JDF OF VENDOR "C"
DFE-INSIDE JOB ATTRIBUTE
ATTRIBUTE NAME
VALUE
ITEM NAME
ITEM VALUE
Amount
CIRCULATION
1~32767
1~32767 CIRCULATIONS
Rotate
ROTATION
Rotate0
0° ROTATION
Rotate90
90° ROTATION
Rotate180
180° ROTATION
Rotate270
270° ROTATION
...

FIG.7B

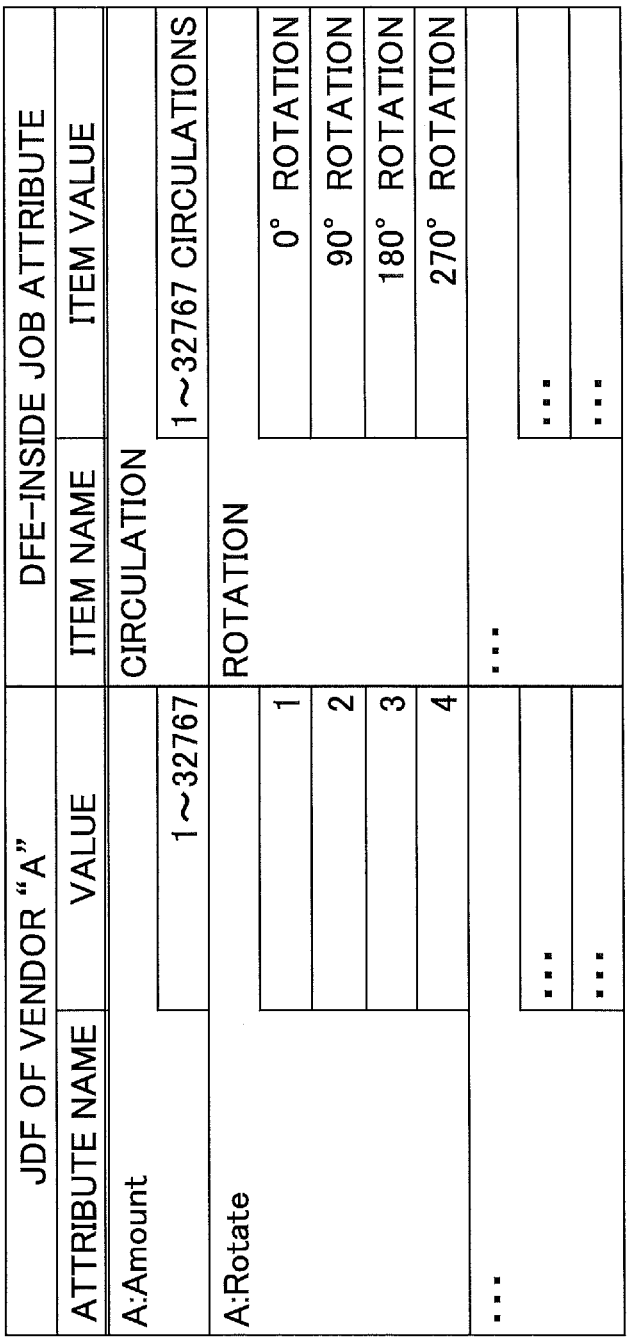

JDF OF VENDOR "A"
ATTRIBUTE NAME
VALUE
A:Amount
1~32767
A:Rotate
1
2
3
4
...
...
...
DFE-INSIDE JOB ATTRIBUTE
ITEM NAME
ITEM VALUE
CIRCULATION
1~32767 CIRCULATIONS
ROTATION
0° ROTATION
90° ROTATION
180° ROTATION
270° ROTATION
...
...
...
...

FIG.7C

JDF OF VENDOR "B"		DFE-INSIDE JOB ATTRIBUTE	
ATTRIBUTE NAME	VALUE	ITEM NAME	ITEM VALUE
B:DeliveryAmount	1~32767	CIRCULATION	1~32767 CIRCULATIONS
B:AlternateRotation	true	ROTATION	
	false		
B:Rotate	1		0° ROTATION
	2		90° ROTATION
	3		180° ROTATION
	4		270° ROTATION
...		...	
	...		...
	...		...

FIG.8A

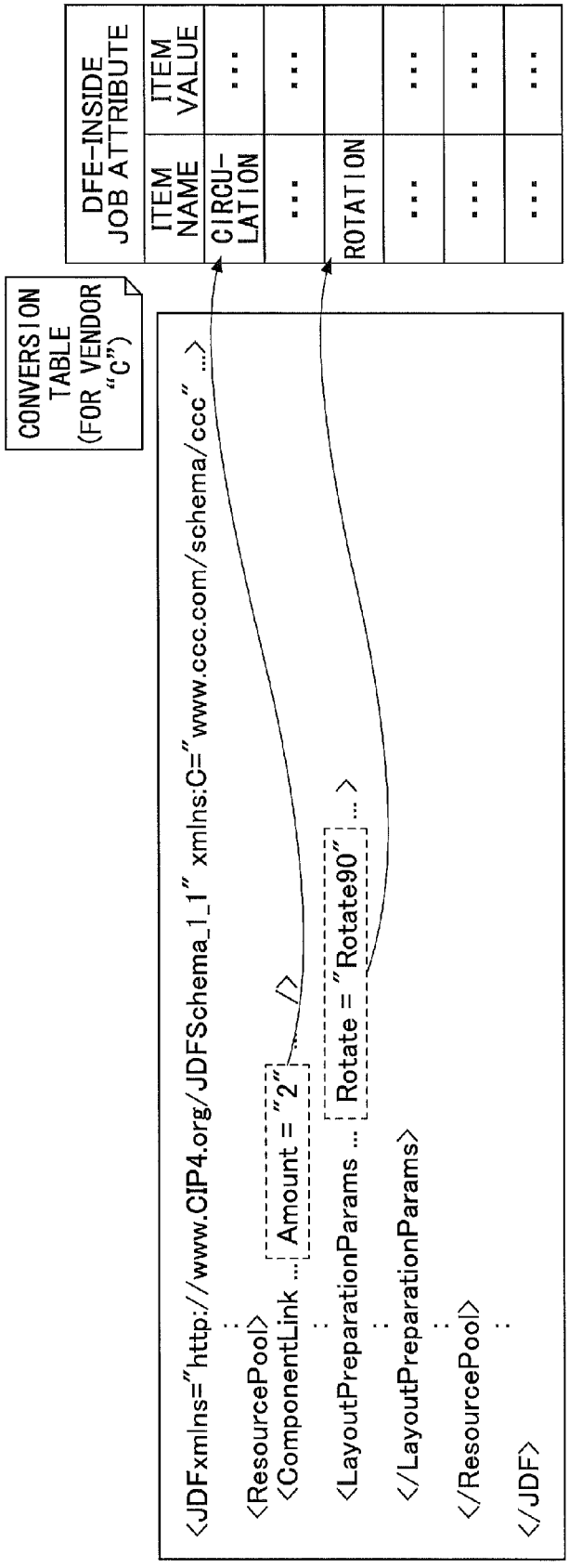

CONVERSION TABLE (FOR VENDOR "C")
DFE-INSIDE JOB ATTRIBUTE
ITEM NAME
ITEM VALUE
CIRCU-LATION
ROTATION
<JDFxmlns="http://www.CIP4.org/JDFSchema_1_1" xmlns:C="www.ccc.com/schema/ccc" ...>
<ResourcePool>
<ComponentLink ... Amount = "2" ... />
<LayoutPreparationParams ... Rotate = "Rotate90" ... >
</LayoutPreparationParams>
</ResourcePool>
</JDF>

FIG.8B

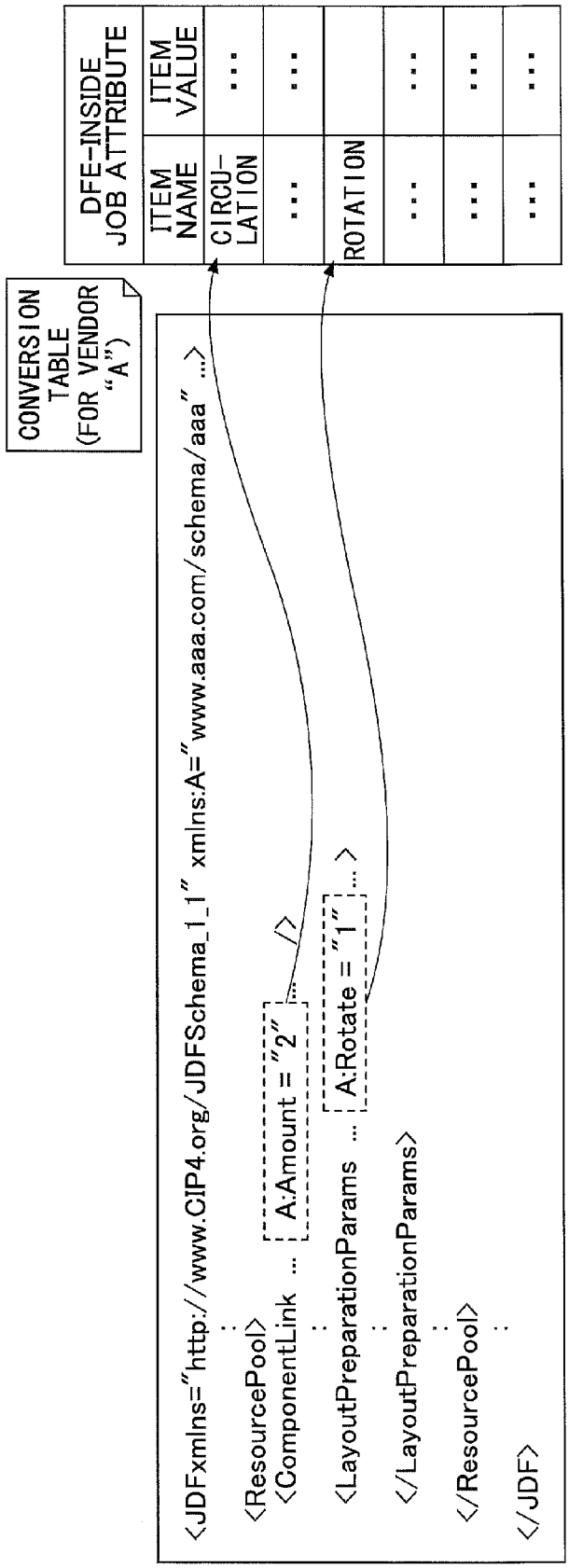
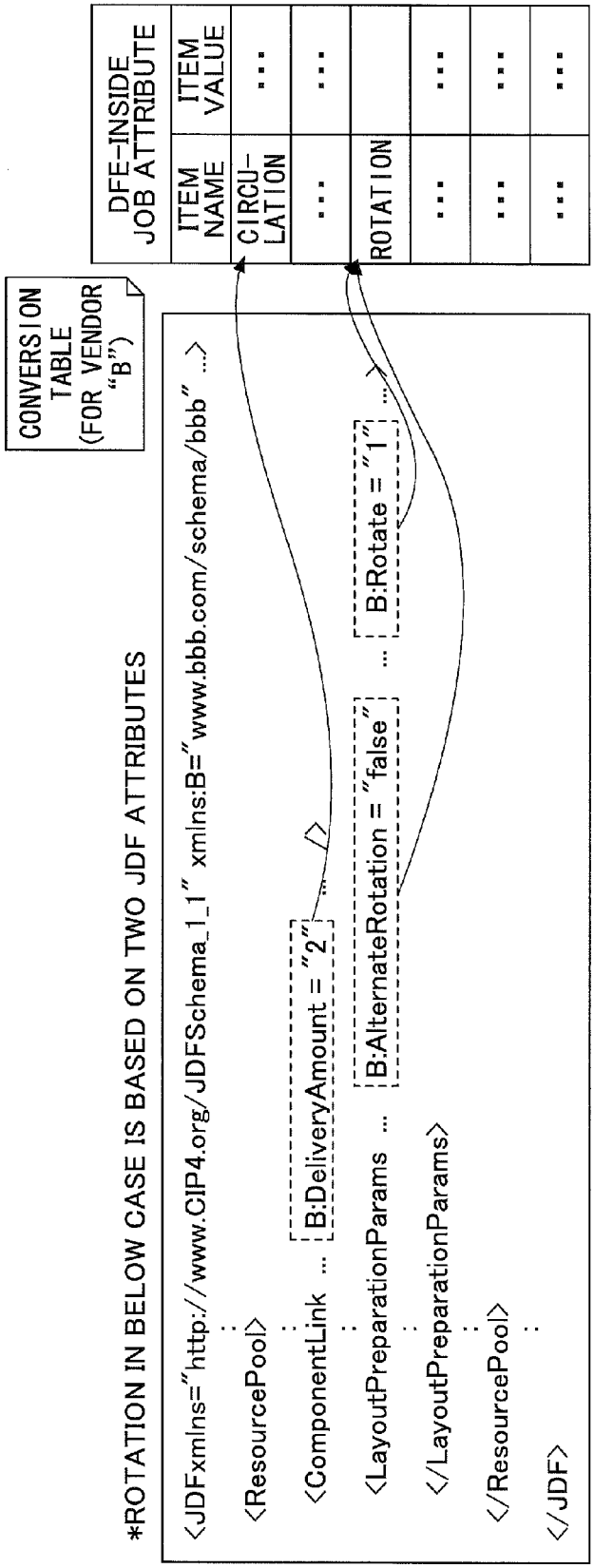

CONVERSION TABLE (FOR VENDOR "A")
DFE-INSIDE JOB ATTRIBUTE
ITEM NAME
ITEM VALUE
CIRCU-LATION
ROTATION
<JDFxmlns="http://www.CIP4.org/JDFSchema_1_1" xmlns:A="www.aaa.com/schema/aaa" ...>
<ResourcePool>
<ComponentLink ... A:Amount = "2" .../>
<LayoutPreparationParams ... A:Rotate = "1" ... >
</LayoutPreparationParams>
</ResourcePool>
</JDF>

FIG.8C


DFE-INSIDE JOB ATTRIBUTE
ITEM NAME
ITEM VALUE
CIRCU-LATION
ROTATION
CONVERSION TABLE (FOR VENDOR "B")
*ROTATION IN BELOW CASE IS BASED ON TWO JDF ATTRIBUTES
<JDFxmlns="http://www.CIP4.org/JDFSchema_1_1" xmlns:B="www.bbb.com/schema/bbb" ...>
<ResourcePool>
<ComponentLink ... B:DeliveryAmount = "2" ...
<LayoutPreparationParams ... B:AlternateRotation = "false" ... B:Rotate = "1" ...
</LayoutPreparationParams>
</ResourcePool>
</JDF>

DFE-INSIDE JOB ATTRIBUTE

ITEMS		
JOB INFORMATION	CIRCULATION	
EDIT INFORMATION	DIRECTION INFORMATION	
	PRINT SURFACE INFORMATION	
	ROTATION	
	ENLARGE/REDUCE	
	IMAGE POSITION	OFFSET
		POSITIONAL ADJUSTMENT INFORMATION
	LAYOUT INFORMATION	CUSTOM IMPOSITION LAYOUT
		NUMBER OF PAGES
		IMPOSITION INFORMATION
		PAGE ORDER INFORMATION
		CREEP POSITION ADJUSTMENT
	MARGIN INFORMATION	
	CROP MARK INFORMATION	CENTER CROP MARK INFORMATION
		CORNER CROP MARK INFORMATION
FINISHING INFORMATION	COLLATE INFORMATION	
	STAPLING/BINDING INFORMATION	
	PUNCHING INFORMATION	
	CREASING INFORMATION	
	TRIMMING INFORMATION	
	OUTPUT TRAY INFORMATION	
	INPUT TRAY INFORMATION	
	COVER SHEET INFORMATION	
RIP CONTROL MODE (PAGE MODE OR SHEET MODE)		

FIG.9

FIG.10

RIP Parameter List DATA FORMAT

ITEMS		
INPUT/OUTPUT DATA TYPE INFORMATION		
INPUT/OUTPUT DATA READ/WRITE POSITION DESIGNATION METHOD INFORMATION		
INPUT/OUTPUT DATA READ/WRITE POSITIONAL INFORMATION		
INPUT/OUTPUT DATA READ/WRITE EXECUTION MODE INFORMATION		
UNIT INFORMATION (DIMENSION)		
INPUT/OUTPUT DATA COMPRESSION METHOD INFORMATION		
RIP CONTROL MODE		
INPUT/OUTPUT IMAGE INFORMATION SECTION	INFORMATION RELATED TO OUTPUT IMAGE	IMAGE FORMAT TYPE
		IMAGE FORMAT DIMENSION
		IMAGE FORMAT RESOLUTION
		IMAGE POSITION
		COLOR SEPARATION INFORMATION
		COLOR PLANE FIT POLICY INFORMATION
		PLANE SHIFT INFORMATION
		IMAGE FORMAT COLOR BIT NUMBER
		IMAGE DIRECTION INFORMATION
		IMAGING POSITIONAL INFORMATION
		IMAGING SIZE INFORMATION
		IMAGING METHOD INFORMATION
		COLOR ICC INFORMATION
		FONT SUBSTITUTION INFORMATION
		IMAGING BASE POINT INFORMATION
		FLAT K BLACK INFORMATION
		RENDERING INFORMATION
	INFORMATION RELATED TO INPUT IMAGE	IMAGE FORMAT TYPE
		IMAGE FORMAT DIMENSION
		IMAGE FORMAT RESOLUTION
		IMAGE POSITION
		INPUT DATA
		PAGE RANGE INFORMATION
		COLOR ICC INFORMATION
	INFORMATION RELATED TO HANDLING OF IMAGE	SCALING OFFSET INFORMATION
		OBJECT AREA INFORMATION
		HALFTONE INFORMATION
		SCALING ALGORITHM INFORMATION
INFORMATION RELATED TO PDL	DATA AREA	
	SIZE INFORMATION	
	DATA LAYOUT METHOD	

FIG.11

SPECIFIC COMMAND	COMMON PDL	PDL-INSIDE SPECIFIC ATTRIBUTE
%% A_CropMark: Center	–	CENTER CROP MARK: ON
2 B_imposition	–	IMPOSITION: 2-UP

FIG.12

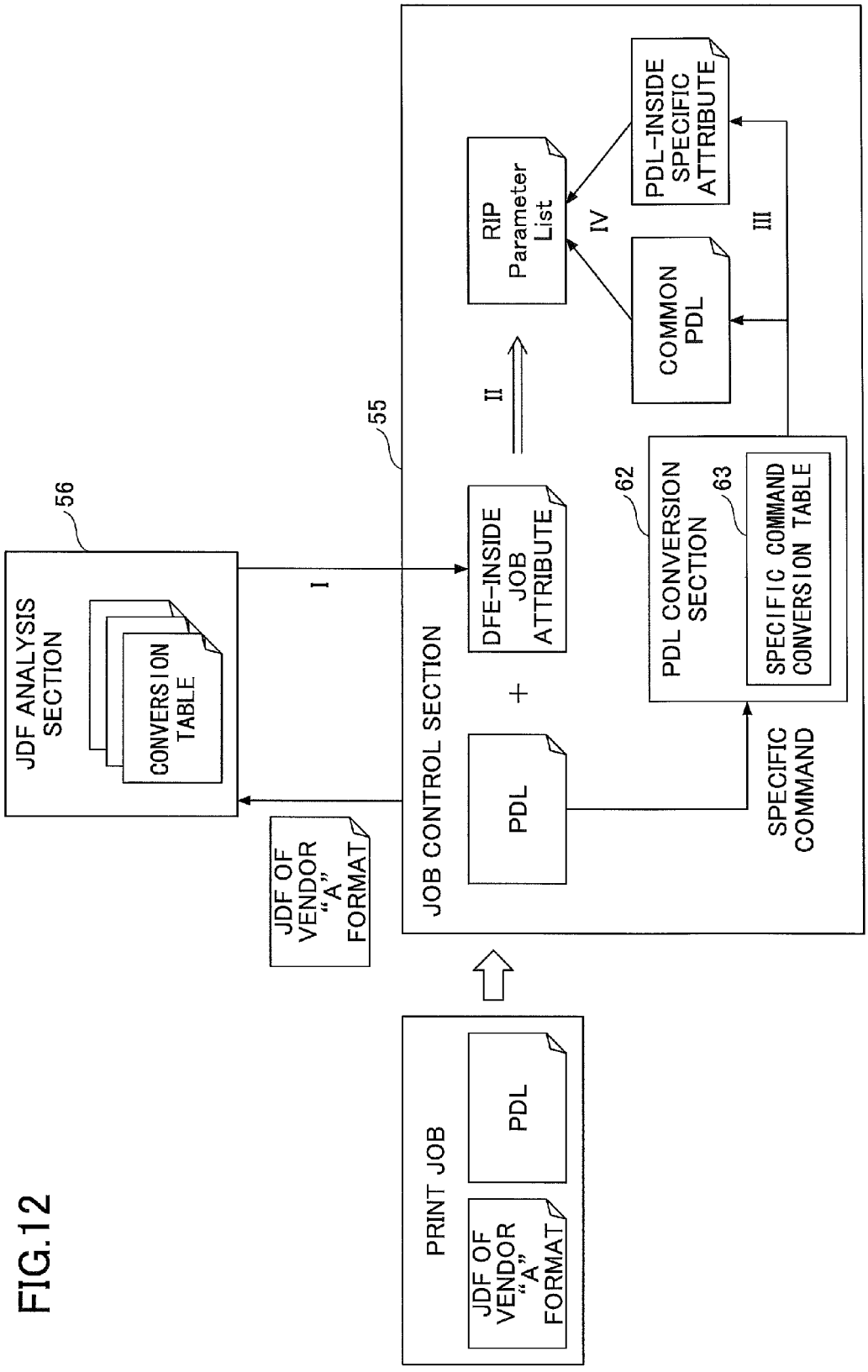
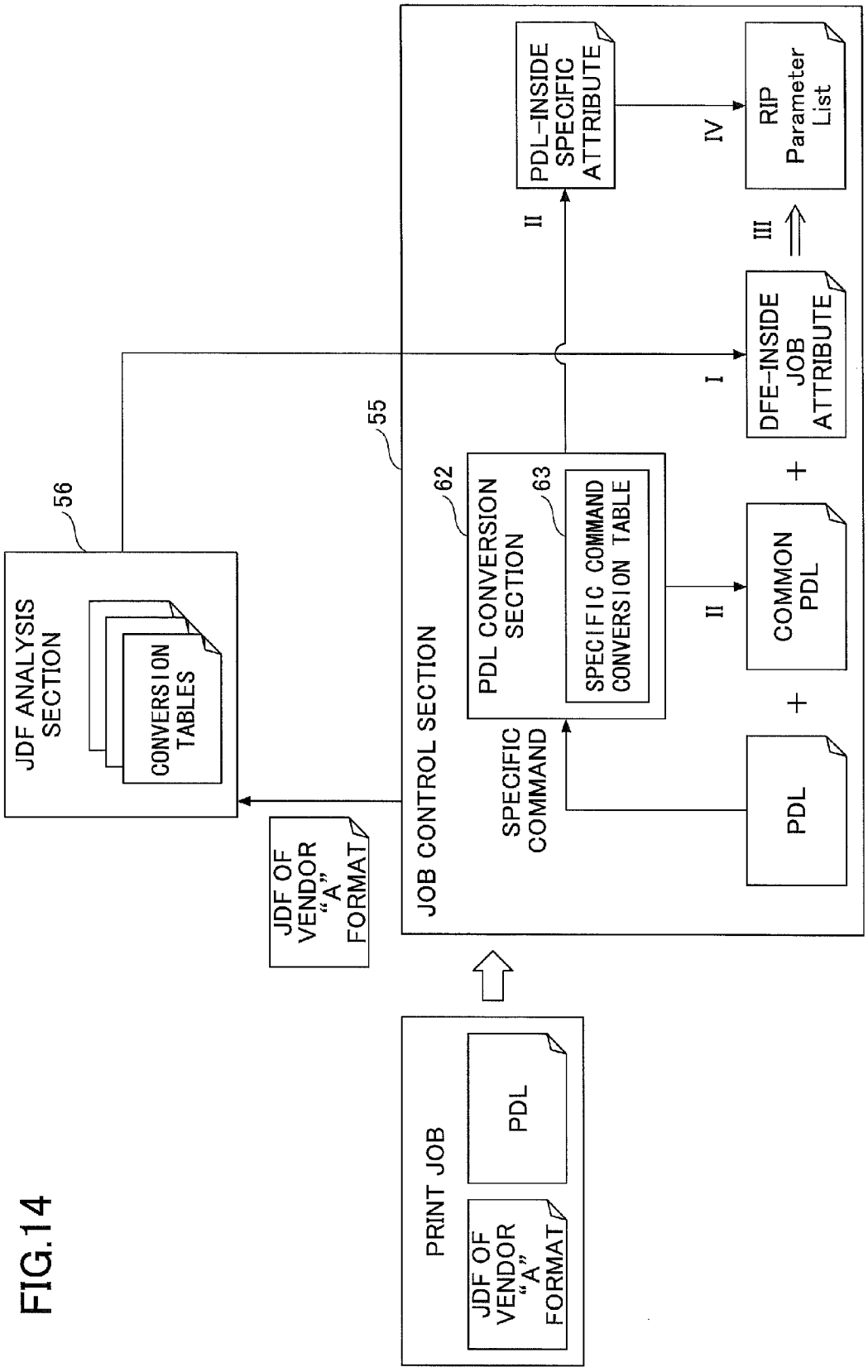

PRINT JOB
JDF OF VENDOR "A" FORMAT
PDL
JOB CONTROL SECTION
55
JDF ANALYSIS SECTION
56
CONVERSION TABLE
JDF OF VENDOR "A" FORMAT
I
DFE-INSIDE JOB ATTRIBUTE
PDL
+
II
RIP Parameter List
COMMON PDL
IV
PDL-INSIDE SPECIFIC ATTRIBUTE
III
62
PDL CONVERSION SECTION
63
SPECIFIC COMMAND CONVERSION TABLE
SPECIFIC COMMAND

FIG.13

RIP Parameter List DATA FORMAT

ITEMS		
INPUT/OUTPUT DATA TYPE INFORMATION		
INPUT/OUTPUT DATA READ/WRITE POSITION DESIGNATION METHOD INFORMATION		
INPUT/OUTPUT DATA READ/WRITE POSITIONAL INFORMATION		
INPUT/OUTPUT DATA READ/WRITE EXECUTION MODE INFORMATION		
UNIT INFORMATION (DIMENSION)		
INPUT/OUTPUT DATA COMPRESSION METHOD INFORMATION		
RIP CONTROL MODE		
INPUT/ OUTPUT IMAGE INFORMATION SECTION	INFORMATION RELATED TO OUTPUT IMAGE	IMAGE FORMAT TYPE
		IMAGE FORMAT DIMENSION
		IMAGE FORMAT RESOLUTION
		IMAGE POSITION
		COLOR SEPARATION INFORMATION
		COLOR PLANE FIT POLICY INFORMATION
		PLANE SHIFT INFORMATION
		IMAGE FORMAT COLOR BIT NUMBER
		IMAGE DIRECTION INFORMATION
		IMAGING POSITIONAL INFORMATION
		IMAGING SIZE INFORMATION
		IMAGING METHOD INFORMATION
		COLOR ICC INFORMATION
		FONT SUBSTITUTION INFORMATION
		IMAGING BASE POINT INFORMATION
		FLAT K BLACK INFORMATION
		RENDERING INFORMATION
		CENTER CROP MARK: ON
	INFORMATION RELATED TO INPUT IMAGE	IMAGE FORMAT TYPE
		IMAGE FORMAT DIMENSION
		IMAGE FORMAT RESOLUTION
		IMAGE POSITION
		INPUT DATA
		PAGE RANGE INFORMATION
		COLOR ICC INFORMATION
	INFORMATION RELATED TO HANDLING OF IMAGE	SCALING OFFSET INFORMATION
		OBJECT AREA INFORMATION
		HALFTONE INFORMATION
		SCALING ALGORITHM INFORMATION
INFORMATION RELATED TO PDL	DATA AREA	
	SIZE INFORMATION	
	DATA LAYOUT METHOD	

FIG.14


PRINT JOB
JDF OF VENDOR "A" FORMAT
PDL
JDF OF VENDOR "A" FORMAT
JOB CONTROL SECTION
55
JDF ANALYSIS SECTION
56
CONVERSION TABLES
PDL CONVERSION SECTION
62
SPECIFIC COMMAND CONVERSION TABLE
63
SPECIFIC COMMAND
PDL
+
COMMON PDL
+
I
II
DFE-INSIDE JOB ATTRIBUTE
III
II
PDL-INSIDE SPECIFIC ATTRIBUTE
IV
RIP Parameter List

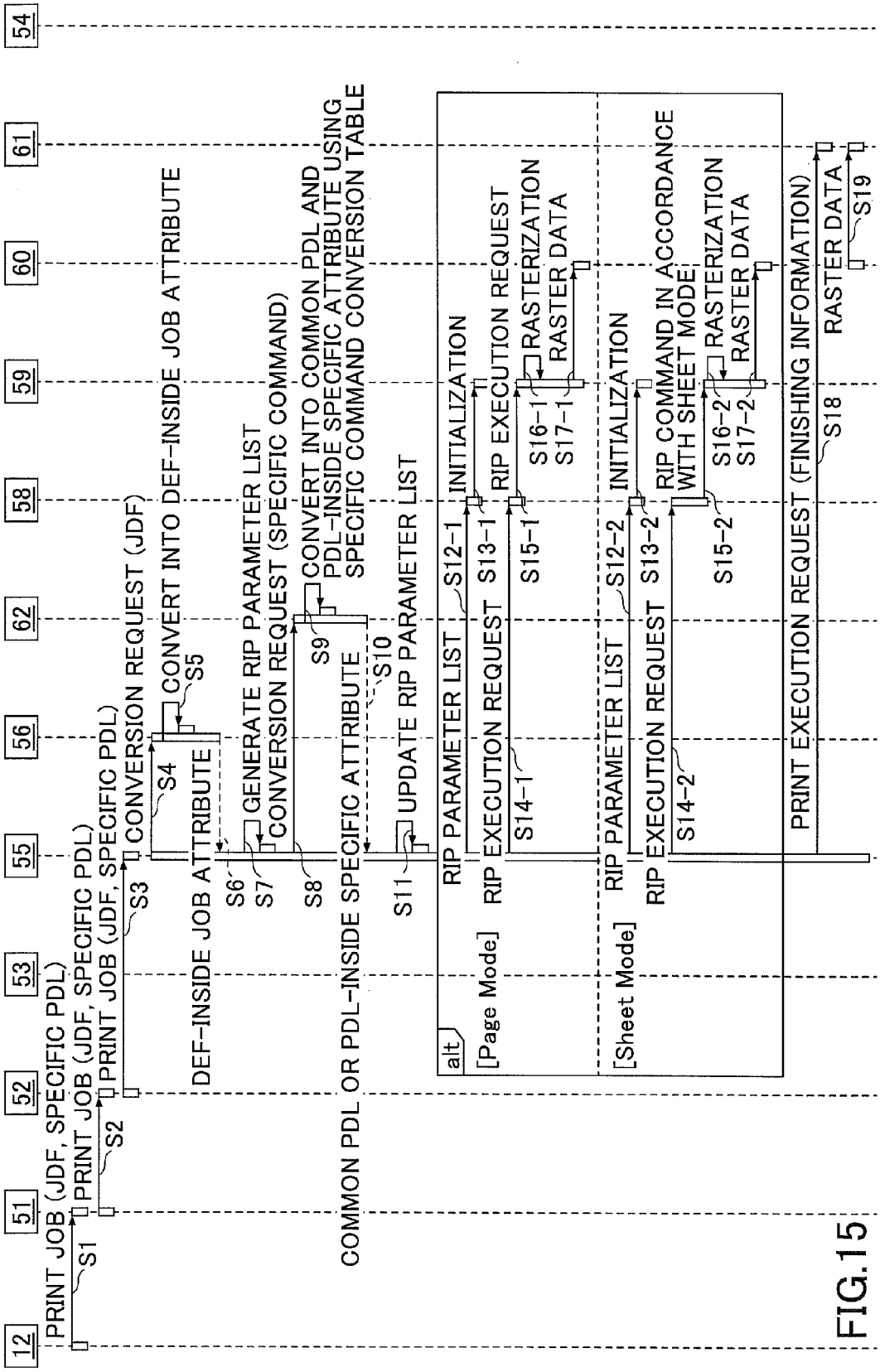

12
51
52
53
55
56
62
58
59
60
61
54
PRINT JOB (JDF, SPECIFIC PDL)
S1
PRINT JOB (JDF, SPECIFIC PDL)
S2
PRINT JOB (JDF, SPECIFIC PDL)
S3
CONVERSION REQUEST (JDF)
S4
CONVERT INTO DEF-INSIDE JOB ATTRIBUTE
S5
DEF-INSIDE JOB ATTRIBUTE
S6
GENERATE RIP PARAMETER LIST
S7
CONVERSION REQUEST (SPECIFIC COMMAND)
S8
CONVERT INTO COMMON PDL AND PDL-INSIDE SPECIFIC ATTRIBUTE USING SPECIFIC COMMAND CONVERSION TABLE
S9
COMMON PDL OR PDL-INSIDE SPECIFIC ATTRIBUTE
S10
UPDATE RIP PARAMETER LIST
S11
alt
[Page Mode]
RIP PARAMETER LIST
S12-1
INITIALIZATION
RIP EXECUTION REQUEST
S13-1
RIP EXECUTION REQUEST
S14-1
S15-1
RASTERIZATION
S16-1
RASTER DATA
S17-1
[Sheet Mode]
RIP PARAMETER LIST
S12-2
INITIALIZATION
RIP EXECUTION REQUEST
S13-2
RIP COMMAND IN ACCORDANCE WITH SHEET MODE
S14-2
S15-2
RASTERIZATION
S16-2
RASTER DATA
S17-2
PRINT EXECUTION REQUEST (FINISHING INFORMATION)
S18
RASTER DATA
S19

FIG.15

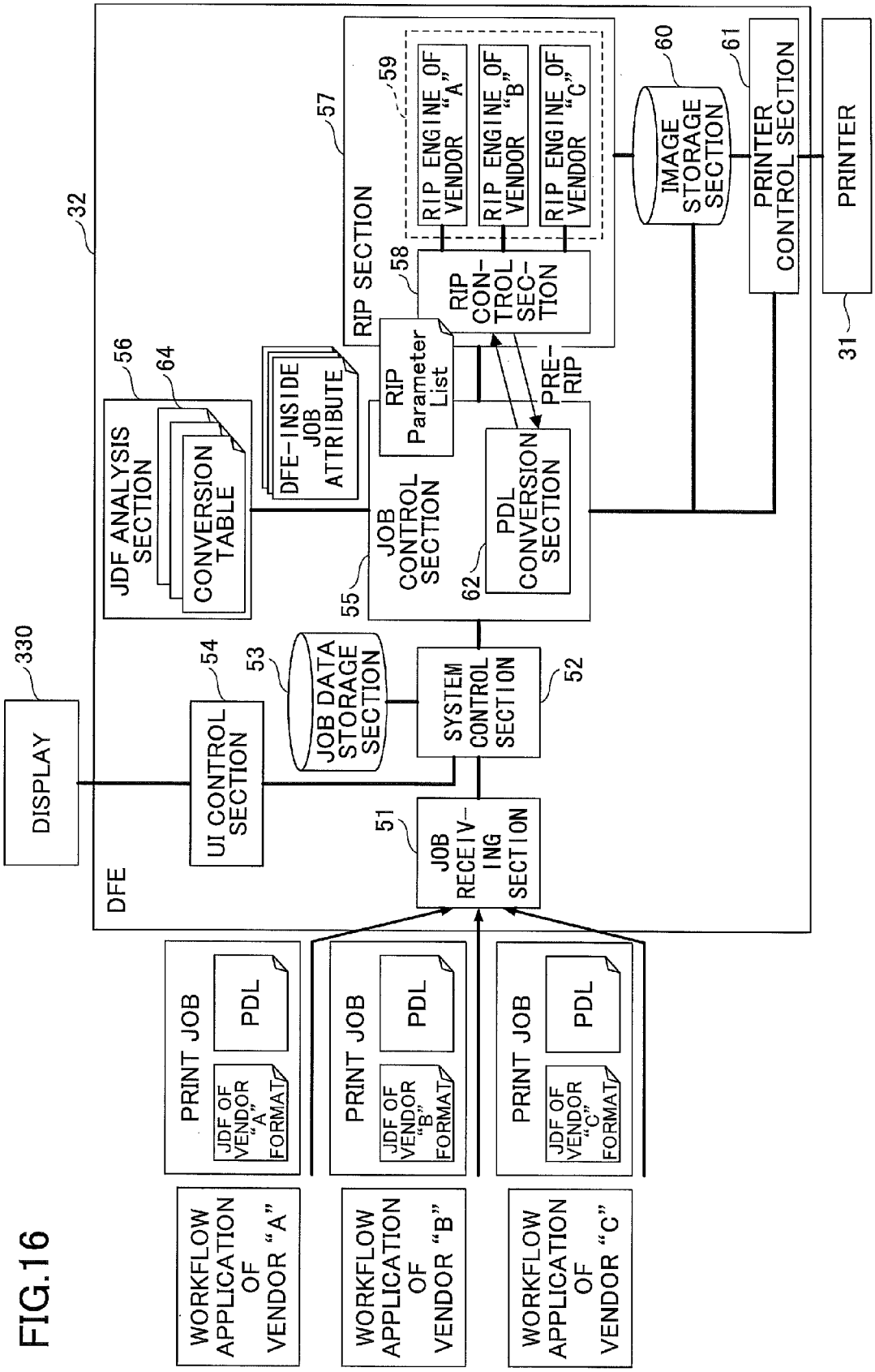
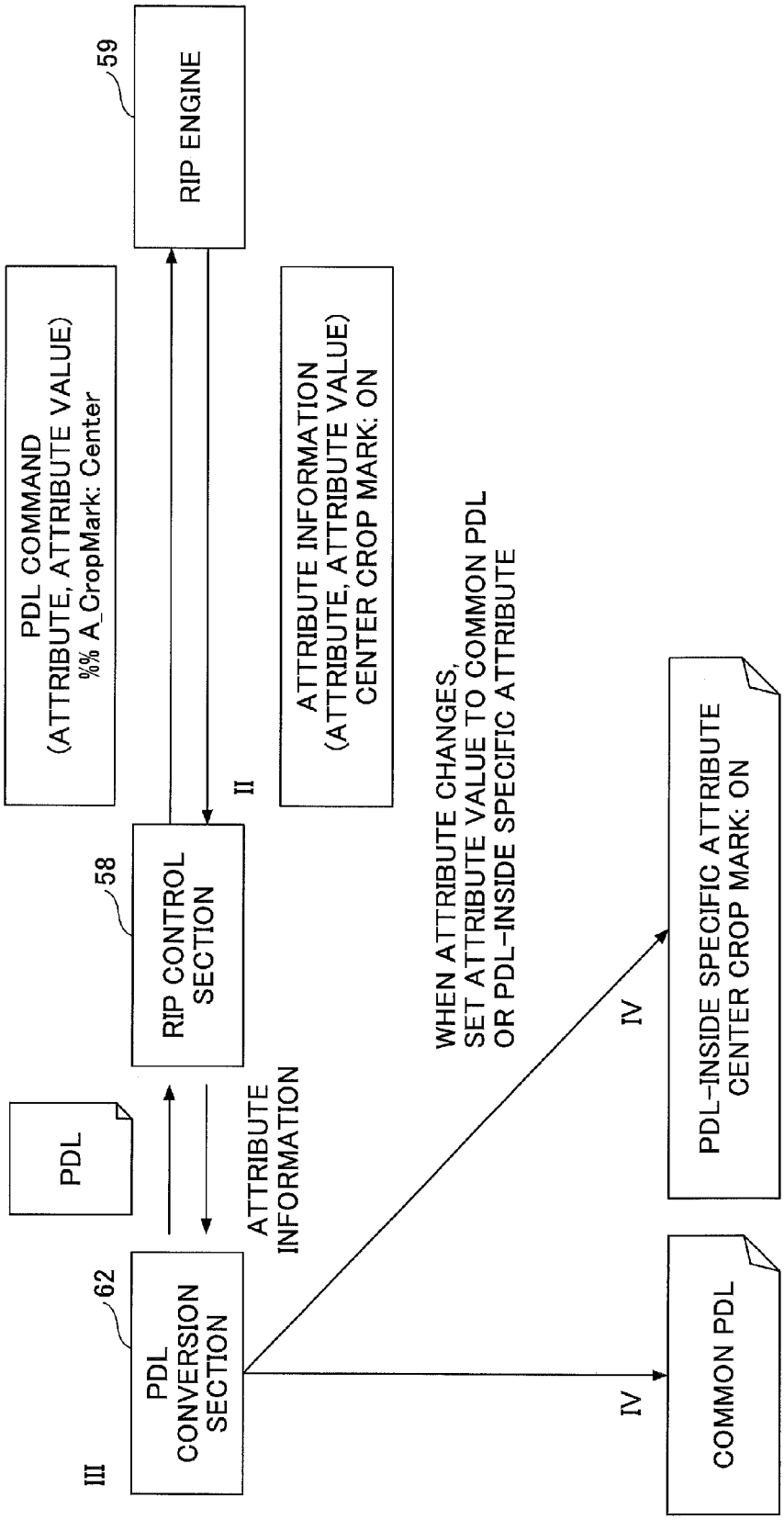

WORKFLOW APPLICATION OF VENDOR "A"
WORKFLOW APPLICATION OF VENDOR "B"
WORKFLOW APPLICATION OF VENDOR "C"
PRINT JOB
JDF OF VENDOR "A" FORMAT
PDL
PRINT JOB
JDF OF VENDOR "B" FORMAT
PDL
PRINT JOB
JDF OF VENDOR "C" FORMAT
PDL
DFE
32
DISPLAY
330
UI CONTROL SECTION
54
JOB DATA STORAGE SECTION
53
SYSTEM CONTROL SECTION
52
JOB RECEIV-ING SECTION
51
JDF ANALYSIS SECTION
56
CONVERSION TABLE
64
DFE-INSIDE JOB ATTRIBUTE
JOB CONTROL SECTION
55
RIP Parameter List
RIP SECTION
57
RIP CON-TROL SEC-TION
58
PRE-RIP
PDL CONVERSION SECTION
62
RIP ENGINE OF VENDOR "A"
RIP ENGINE OF VENDOR "B"
RIP ENGINE OF VENDOR "C"
59
IMAGE STORAGE SECTION
60
PRINTER CONTROL SECTION
61
PRINTER
31

FIG.16

FIG.17


59
RIP ENGINE
I
PDL COMMAND
(ATTRIBUTE, ATTRIBUTE VALUE)
%% A_CropMark: Center
II
ATTRIBUTE INFORMATION
(ATTRIBUTE, ATTRIBUTE VALUE)
CENTER CROP MARK: ON
58
RIP CONTROL SECTION
PDL
ATTRIBUTE INFORMATION
WHEN ATTRIBUTE CHANGES,
SET ATTRIBUTE VALUE TO COMMON PDL
OR PDL-INSIDE SPECIFIC ATTRIBUTE
62
PDL CONVERSION SECTION
III
IV
IV
PDL-INSIDE SPECIFIC ATTRIBUTE
CENTER CROP MARK: ON
COMMON PDL

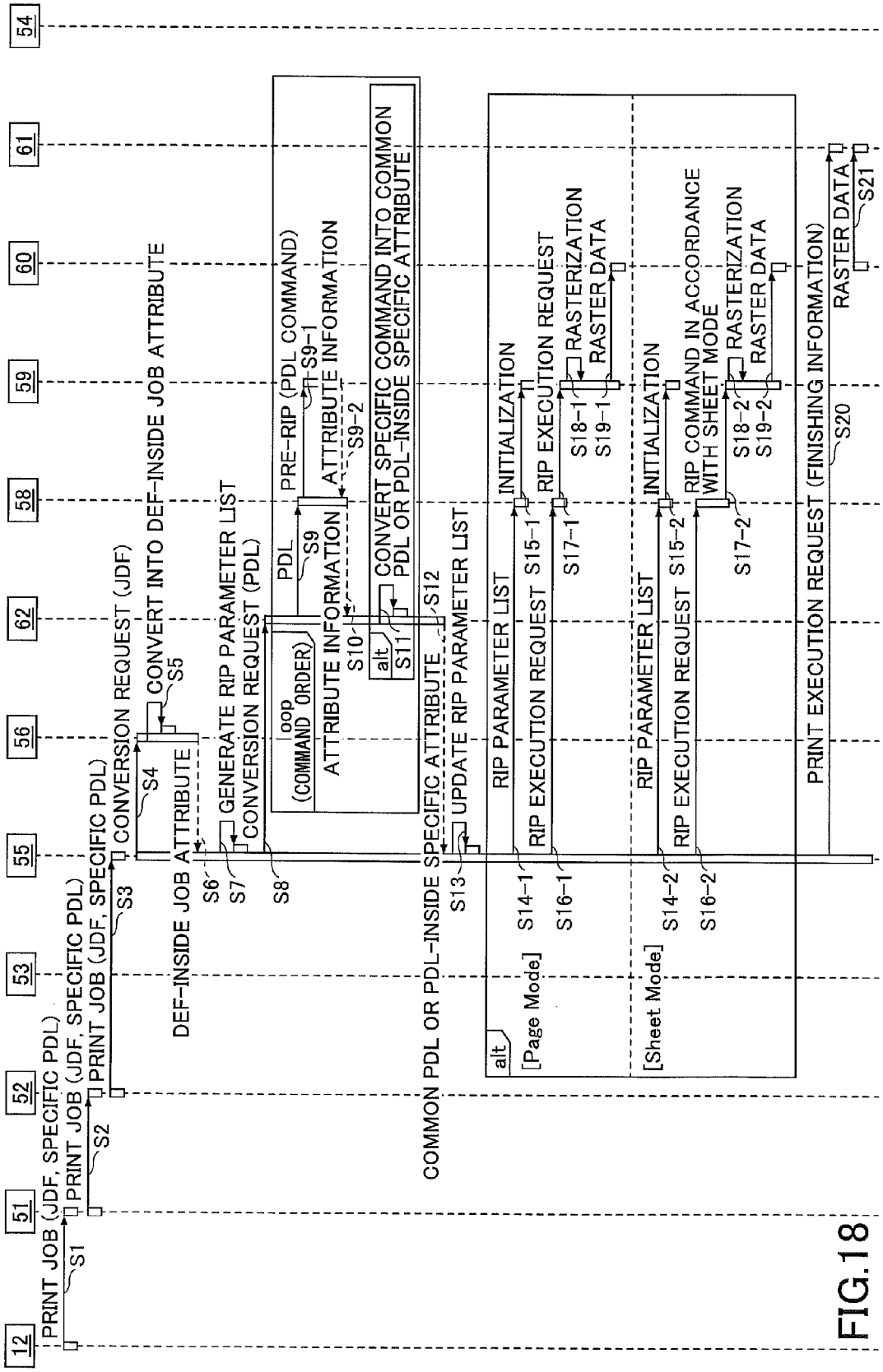

12
51
52
53
55
56
62
58
59
60
61
54
PRINT JOB (JDF, SPECIFIC PDL)
S1
PRINT JOB (JDF, SPECIFIC PDL)
S2
PRINT JOB (JDF, SPECIFIC PDL)
S3
CONVERSION REQUEST (JDF)
S4
CONVERT INTO DEF-INSIDE JOB ATTRIBUTE
S5
DEF-INSIDE JOB ATTRIBUTE
S6
GENERATE RIP PARAMETER LIST
S7
CONVERSION REQUEST (PDL)
S8
loop
(COMMAND ORDER)
PDL
S9
PRE-RIP (PDL COMMAND)
S9-1
ATTRIBUTE INFORMATION
S9-2
ATTRIBUTE INFORMATION
S10
alt
S11
CONVERT SPECIFIC COMMAND INTO COMMON PDL OR PDL-INSIDE SPECIFIC ATTRIBUTE
S12
COMMON PDL OR PDL-INSIDE SPECIFIC ATTRIBUTE
S13
UPDATE RIP PARAMETER LIST
alt
[Page Mode]
RIP PARAMETER LIST
S14-1
INITIALIZATION
S15-1
RIP EXECUTION REQUEST
S16-1
RIP EXECUTION REQUEST
S17-1
RASTERIZATION
S18-1
RASTER DATA
S19-1
[Sheet Mode]
RIP PARAMETER LIST
S14-2
INITIALIZATION
S15-2
RIP EXECUTION REQUEST
S16-2
RIP COMMAND IN ACCORDANCE WITH SHEET MODE
S17-2
RASTERIZATION
S18-2
RASTER DATA
S19-2
PRINT EXECUTION REQUEST (FINISHING INFORMATION)
S20
RASTER DATA
S21

FIG.18

INFORMATION PROCESSING APPARATUS, INFORMATION PROCESSING METHOD, AND RECORDING MEDIUM FOR CONVERSION OF VENDOR-SPECIFIC PRINT DATA

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is based on and claims the benefit of priority under 35 U.S.C §119 of Japanese Patent Application Nos. 2014-028527 filed Feb. 18, 2014 and 2015-024278 filed Feb. 10, 2015, the entire contents of which are hereby incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to an information processing apparatus and the like capable of acquiring a print job including print data and setting information and generating drawing data.

2. Description of the Related Art

There has been known a so-called "production printing" of printing a large quantity of documents and binding such documents into a books for professional use (see, for example, Japanese Patent Laid-open Publication No. 2012-238188). Japanese Laid-open Patent Publication No. 2012-238188 discloses a printing system capable of notifying a user of whether the post processing can be used based on a status of a printing system as a whole.

SUMMARY OF THE INVENTION

According to an aspect of the present invention, an information processing apparatus for generating drawing data by using a print job including print data and setting information, includes a description detection unit detecting a characteristic description included in the print data; a conversion unit converting the print data, the characteristic description, and the setting information into an instruction group; and one or more drawing data generation units generating the drawing data by executing the instruction group.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features, and advantages of the present invention will become more apparent from the following description when read in conjunction with the accompanying drawings, in which:

FIGS. **1**A through **1**C are drawings illustrating an example of an inconvenience where a print job is acquired;

FIGS. **2**A and **2**B are drawings illustrating an example of printing the print job based on a Digital Front End (DFE) according to an embodiment;

FIG. **3** is a drawing illustrating an example overall configuration of a print system;

FIG. **4** is a drawing illustrating an example of a hardware configuration of the DFE;

FIG. **5** is a drawing illustrating an example functional block diagram of the DFE;

FIGS. **6**A through **6**C are drawings illustrating examples of parts of descriptions of Job Definition Format (JDF);

FIGS. **7**A through **7**C are drawings illustrating examples of conversion tables;

FIGS. **8**A through **8**C are drawings illustrating generation of "DFE-inside job attribute";

FIG. **9** is a drawing illustrating an example of the "DFE-inside job attribute";

FIG. **10** is a drawing illustrating an example of "RIP Parameter List";

FIG. **11** is a drawing illustrating an example of own command conversion table;

FIG. **12** is a drawing schematically illustrating a procedure of generating the "RIP Parameter List";

FIG. **13** is a drawing illustrating an example of the "RIP Parameter List" after revision;

FIG. **14** is a drawing schematically illustrating another procedure of generating the "RIP Parameter List";

FIG. **15** is a sequence diagram illustrating an example procedure of rendering the print job by the DFE;

FIG. **16** is an example functional block diagram of the DFE according to an embodiment;

FIG. **17** is a drawing schematically illustrating conversions to common Page Description Language (PDL) and own attribute in PDL by Pre-RIP; and

FIG. **18** is a sequence diagram illustrating an example procedure of rendering the print job by the DFE.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In related-art production printing, a print process is usually treated as a workflow. Further, a print workflow is more and more open. As a result, it becomes possible for venders who provide software solutions (workflow applications described below) or print apparatuses to describe settings in print jobs in main steps of printing using a common description method. As a format of describing an overall print workflow process, a standard format called "Job Definition Format (JDF)" is known.

The overall print workflow process includes various processes of generating a document or content, designating a print method, printing, post processing, etc. Basically, those processes are performed by various workflow applications or a print apparatus. However, by using the JDF, it becomes possible for print apparatuses to work together and to manage the print process.

However, there may be a case where the workflow applications or the print apparatus extends the JDF. In this case, the JDF generated by the workflow applications of the vendors may include a description specific to the workflow applications.

FIG. **1**A illustrates an example of an inconvenience in a case where a print processing apparatus of vendor "C" receives print jobs. Here, note that FIG. **1** illustrates a comparative example and is not illustrated as prior art. In FIG. **1**A, the print processing apparatus of vendor "C" receives the print jobs from workflow applications of vendors "A", "B", and "D". Here, the workflow applications have extended the respective JDFs. Therefore, there may be case where the print processing apparatus of vendor "C" cannot analyze and perform processing on the JDFs.

In order to correspond to the print jobs of the workflow applications, it is thought that the print processing apparatus of vendor "C" includes rendering engines which correspond to the JDF conversions and workflow applications (hereinafter "RIP engines").

In FIG. **1**B, a JDF analysis section analyzes the JDFs, determines the respective vendors (suppliers) of the workflow applications who generated the JDFs, and converts the JDFs into setting information the print processing apparatus

of vendor "C" can handle. Further, by having the RIP engines corresponding to the workflow applications, it becomes possible to perform the print jobs (print), which are generated by the workflow applications, in accordance with the user's intentions.

Therefore, even when the workflow applications extend the respective JDFs, it becomes possible for the print processing apparatus of vendor "C" to print the print jobs, which are generated by the workflow applications of the vendors "A", "B", and "D", in workmanship in accordance with the user's intentions.

On the other hand, there may be a case where a user would like to use the print processing apparatus of vendor "C" to print the print jobs that are generated by the workflow applications of the vendors "A", "B", and "D" even though the workmanship of the print slightly differs from that in accordance with the user's intentions. For example, a user may have a request (desire) to print the print job generated by the workflow application of the vendor "A" by using the not only the RIP engine of the vendor "A" but also the RIP engine of the vendor "B" or "D". Further, in a case where the RIP engines support a general-purpose Page Description Language (PDL) such as PostScript and PDF, any of the RIP engines may print the print jobs.

However, there may be a case where it is not possible for the RIP engine of the vendor "B" or "D" to print the print job generated by the workflow application of the vendor "A". FIG. **1**C illustrates an example of a problem in a case where the RIP engine of the vendor "B" or "D" prints the print job generated by the workflow application of the vendor "A". As illustrated in FIG. **1**C, it is not possible for the RIP engines of the vendors "B" and "D" to print the print job generated by the workflow application of the vendor "A".

This may occur even when, for example, the JDF analysis section converts the JDFs into the setting information that can be handled by the print processing apparatus of vendor "C". This is because the PDL may include commands specific to the respective vendors. For example, in a case where the PDL is PostScript, the PDL is more likely to include commands that are specific to the respective vendors, so that neither the RIP engine of the vendor "B" nor the RIP engine of the vendor "D" can print the print job generated by the workflow application of the vendor "A" even when the RIP engines of the vendors "B" and "D" support the Postscript.

The present invention is made in light of the above problem, and may provide an information processing apparatus capable of outputting an appropriate print output upon receiving a print job.

In the following, embodiments of the present invention are described with reference to the accompanying drawings.

First Embodiment

Outline of Embodiment in Printing a Print Job

FIG. **2**A illustrates an example where a Digital Front End (DFE) according to this embodiment prints a print job. The DFE in FIG. **2**A corresponds to the print processing apparatus. As illustrated in FIG. **2**A, a DFE **32** of a vendor "C" includes a JDF analysis section **56** that converts the JDFs generated by the vendors "A", "B", and "C" into setting information that can be handled by the DFE **32** of the vendor "C" ("DFE inside job attribute"). The DFE **32** of the vendor "C" further includes RIP engines of the respective vendors "A", "B", and "C". Herein, description of a RIP engine of the vendor "D" is omitted.

The RIP engines have aptitudes for rendering (performing a drawing process) the print jobs generated for the RIP engines. Therefore, the print job generated by the workflow application of the vendor "A" is assumed to be rendered by the RIP engine of the vendor "A". Similarly, the print job generated by the workflow application of the vendor "B" is assumed to be rendered by the RIP engine of the vendor "B", and the print job generated by the workflow application of the vendor "C" is assumed to be rendered by the RIP engine of the vendor "C". Herein, note that the workflow application and the RIP engine of the vendor "X" refer to the workflow application and the RIP engine that are not only directly generated by the vendor "X" but also generated by a vendor other than vendor "X" for the vendor "X".

Further, the DFE **32** includes a PDL conversion section **62**. The PDL conversion section **62** detects vendor "A", "B", and "C" specific commands (an example of claimed "characteristic description") in the PDL, and sets the detected vendor "A", "B", and "C" specific commands as attribution values of "RIP Parameter List" (an example of "order group") which is handled by the DFE **32** of the vendor "C".

In the following, a case is described where the workflow application of the vendor "A" generates a print job and the print job is printed by not only the RIP engine of the vendor "A" but also the RIP engine of the vendor "B" or "C".

FIG. **2**B schematically illustrates the setting of the "RIP Parameter List" by the specific commands. The PDL conversion section **62** includes a specific command conversion table **63**. In the specific command conversion table **63**, specific commands are registered. The PDL conversion section **62** converts the specific commands into respective "PDL-inside specific attributes" and a "common PDL".

Herein, the term "specific command" refers to a PDL command that can be processed by the RIP engine that is assumed by the workflow application that generates the PDL. The term "common PDL" refers to a PDL command which is common among the vendors of the RIP engines. Further, the term "PDL-inside specific attribute" refers to attribute information that is converted from the specific command and to be set in the "RIP Parameter List".

The "common PDL" (an example of the claimed "corresponding print data") is common among the vendors. Therefore, there has been a conventional item to be set in the "RIP Parameter List". The PDL-inside specific attribute has been converted into the attribution information. Therefore, the PDL-inside specific attribute is set as an item corresponding to the "RIP Parameter List". Namely, the PDL-inside specific attribute is a setting item in printing. Therefore, there exists a corresponding item in the "RIP Parameter List". For example, there is a case where a setting that is to be set in the JDF is described in the PDL as a specific command. In this case, the specific command is converted into the PDL-inside specific attribute. Therefore, the specific command is set as an item of the "RIP Parameter List" that is to be set when the specific command is written in the JDF.

By doing this, even when a PDL of a print job generated by workflow application of the vendor "A" includes a specific command, it is possible to acquire the "RIP Parameter List" that does not include the specific command and having an appropriate item where an item value is set. Therefore, it becomes possible for not only the RIP engine of the vendor "A" but also the RIP engines of the vendors "B" and "C" to print a print job that is generated by the workflow application of the vendor "A".

Example Configuration

FIG. **3** illustrates an example overall configuration of a print system **200** according this embodiment. The print system **200** according to this embodiment includes one or more end user environments **1** and a Print On Demand (POD) print system environment **2** which are connected to each other via a network **3**.

The end user environment **1** includes a client personal computer (PC) **11**. The client PC **11** includes a workflow application for POD print business purposes (hereinafter simplified as "application") **12**, so that a print job can be generated based on a user's operation.

The application **12** can perform a collective print function to adhere plural logical page images on a sheet surface (Number-up printing function) and an image edit function to add a header, a footer, a page number, etc., to the sheet surface. Further, the application **12** can designate instructions to punch, staple, etc., for binding prints. Those instructions and setting are described in the JDF. The JDF may be referred to as a "job ticket", "operative instructions", "print instructions", etc.

The POD print system environment **2** includes a process management section **20**, a digital print section **30**, and a post press section **40**, which are connected to each other via the network **3**. The process management section **20** sends operational instructions to the digital print section **30** and the post press section **40** in the POD print system environment **2** and collectively manages the workflow of the POD print system environment **2**.

The process management section **20** receives a print job (JDF and PDL) from the end user environment **1**, and stores the print job. The JDF is an example of claimed "setting information". The PDL is an example of claimed "print data". Basically, the PDL refers to a language to construct drawing content of a page image (a rasterized image). However, the term "PDL" herein refers to data described in a PDL. As the "PDL", there are, a Portable Document Format (PDF), Postscript, PCL, RPDL, etc.

Further, the process management section **20** can construct step operations as a workflow based on the print job from the end user environment **1**, perform scheduling on the operations of the digital print section **30** and the post press section **40**, and operators' operations, and notify an operator when an error occurs when necessary in automatic operation. Generally, the process management section **20** includes one or more PC servers **21**.

The process management section **20** transmits the print job to the digital print section **30** to perform printing. Further, printed sheets (paper) are transmitted to the post press section **40**, so that the post press section **40** performs processes such binding based on an instruction from the process management section **20**. Further, the print job may be directly transmitted from the digital print section **30** to the post press section **40**.

The digital print section **30** includes various printers **31** (printing apparatus such as, for example, a production oriented printer, a high-speed color inkjet printer, and a color/monochrome MultiFunction peripheral (MFP)). The digital print section **30** further includes a DFE **32**. The DFE **32** may also be called the "print processing apparatus", and controls printing by the printers **31**. The DFE **32** may be separated from the printers **31**, or may be integrated into the printers **31**. Upon receiving the print job from the process management section **20**, the DFE **32** generates raster data (an example of claimed "drawing data") based on the JDF and the PDL so that the printers **31** can form a toner image or an image with ink, and transmits the raster data to the printers **31**.

As described above, the digital print section **30** includes various printers **31**. The digital print section **30** may further include a printer **31** that is directly connected to a finisher (post-processing apparatus), which performs post processing (post fabrication work) such as creasing, saddle stick binding, case working, punching, etc., on the printed recorded sheets.

The post press section **40** includes post processing devices such as a creasing device, a saddle stitching machine, a case working machine, a cutting machine, a mail inserter, a page setter, etc., in accordance with an operational instruction of printed sheets (post press job) received from the process management section **20**. Further, the post press section **40** performs a finishing process such as creasing, saddle stick binding, case working, cutting, inserting, page setting, etc., on the printed sheets which are output from the digital print section **30**. To that end, the post press section **40** includes post processing apparatuses to perform post processing (post fabrication work) after digital printing such as a stapler **401** and a punching machine **402**.

An end user in the end user environment **1** uses the application **12** via the client PC **11** to send an instruction for editing an image, printing, inserting texts, post processing, etc., and transmits the print job to the process management section **2** of the POD print system environment **2**.

The PC server **21** of the process management section **20** sends a print instruction to the digital print section **30** based on the JDF, and sends an instruction for the post processing to the post press section **40**.

Hardware Configuration

In this embodiment, the print job generated by the end user environment **1** is received by the process management section **20**, and the process management section **20** transmits the print job to the DFE **32**. The functions of the DFE **32** according to this embodiment may not be directly performed by the DFE **32** if a device on the network can perform functions. However, in this embodiment, it is assumed that the DFE **32** performs a process of converting the (PDL) specific command into the PDL-inside specific attributes and the common PDL.

FIG. **4** illustrates an example hardware configuration of the DFE **32**. The DFE **32** can be realized by having, for example, the hardware configuration as illustrated in FIG. **4**. Namely, the DFE **32** has the functions of an information processing apparatus (computer). The DFE **32** includes a Central Processing Unit (CPU) **321**, a Random Access Memory (RAM) **322**, an auxiliary storage device **323**, a communication device **324**, an input device **325**, a display control section **326**, and a recording medium interface (I/F) **327**.

The CPU **321** controls the overall DFR **32** by executing a program **328** using the RAM **322** as a working memory. The auxiliary storage device **323** is a non-volatile memory such as a hard Disk Drive (HDD) or a Solid State Drive (SSD). The auxiliary storage device **323** stores a program **328** which has a function of converting a print job.

The communication device **324** is a modem, a Local Area Network (LAN) card or the like to be connected to the network **3** to communicate with the end user environment **1**, the process management section **20** or the post press section **40**, and the printers **31**. The input device **325** is a keyboard, a mouse and the like to receive user's operations. The display control section **326** is connected to a display **330**,

and causes the display **330** to display a screen based on an instruction from the CPU **321**. The display **330** may include a touch panel.

The recording medium I/F **327** is provided in a manner so that a removable recording medium **331** can be attached to and detached from the recording medium I/F **327**. The recording medium I/F **327** reads data from a recording medium **331** and write data into the recording medium **331** based on the instructions from the CPU **321**. As the recording medium **331**, various types of the recording media may be used including, for example, a medium recording optically, electrically, or magnetically such as a Compact Disc Read-Only Memory (CD-ROM), an optical disk, a Universal Serial Bus (USB) memory, a SD card (registered trademark), etc., or a semiconductor memory electrically recording information such as a flash memory, etc.

Further, the program **328** is distributed via a recording medium with the program **328** stored therein or may be downloaded via the network **3** from a server (not shown).

Further, the client PC **11** of the end user environment **1** and the PC server **21** of the process management section **20** may also have a hardware configuration similar to that as described in FIG. **4**.

Functions of the DFE **32**

FIG. **5** illustrates an example functional block diagram of the DFE **32**. In a print workflow, the DFE **32** performs job control, Raster Image Processor (RIP) control, and printer control. Namely, the DFE **32** functions as a server that provides main print functions to the end user environment **1** and the process management section **20**. Here, the job control refers to a series of control in a procedure of a print job including receipt of a print job, analysis of the JDF, generation of the raster data, printing by a printer **31**, etc.

The RIP control herein refers to the control of generating the "RIP Parameter List" to cause the RIP engine **59** to generate the raster data after the generation of the "DFE inside job attribute". The "RIP" stands for "Raster Image Processor", and refers to a dedicated Integrated Circuit (IC) for generating the raster data or the generation of the raster data. The printer control is control of transmitting the raster data and a part of "DFE inside job attribute" ("Finishing information" described below) to the printer for printing.

The DFE **32** includes a job receiving section **51**, a system control section **52**, a user interface (UI) control section **54**, a job control section **55**, the JDF analysis section **56**, a RIP section **57**, a RIP control section **58**, a RIP engine **59**, and a printer control section **61**. These elements can be realized when the CPU **321** executes the program **328** and various hardware elements of FIG. **4**, etc., work together. The DFE **32** further includes a job data storage section **53** and an image storage section **60** that are formed of the auxiliary storage device **323**, the RAM **322**, the recording medium **331**, etc.

The job receiving section **51** receives the print job from the application **12**, etc., via the network **3**. As the logs, a unique job number, received day and time, finished day and time, a status, etc., are stored in association with the print job. The print job is input from the application **12** but may be input via the USB memory, etc. In this embodiment, it is assumed that the JDF is included in the print job. However, when the JDF is not included in the print job, the job receiving section **51** may generate a dummy JDF to make it possible to perform rendering.

The system control section **52** stores the received print job into the job data storage section **53** or outputs the received print job to the job control section **55**. For example, in a case where it is determined that a print job is to be stored in the job data storage section **53** of the DFE **32**, the system control section **52** stores the received print job into the job data storage section **53**. Further, in a case where, in the JDF, the information is described whether to be stored into the job data storage section **53**, the system control section **52** follows the described information.

Further, when, for example, a user operates to display the content of the print job, which is stored in the job data storage section **53**, on the display **330**, the system control section **52** outputs the JDF from the job data storage section **53** to the UI control section **54**. Further, when a user changes the JDF, the UI control section **54** receives the changed content and the system control section **52** stores again the changed (revised) print job into the job data storage section **53**.

Further, upon receiving an instruction to perform the print job from a user, the end user environment **1**, or the process management section **20**, the system control section **52** outputs the print job stored in the job data storage section **53** to the job control section **55**. Further, for example, in a case where print time is set in the JDF, the system control section **52** outputs the print job stored in the job data storage section **53** to the job control section **55** at the print time.

The job data storage section **53** is a storage area to store the print job as described above, and is formed in the auxiliary storage device **323** of the DFE **32** or in the recording medium **331**. The job data storage section **53** may be formed (provided) in a storage device (not shown) on a network.

The UI control section **54** interprets the JDF and displays the content of the print job on the display **330**. Further, the UI control section **54** can display the raster data, which are generated by the RIP engine **59**, on the display **330**.

The job control section **55** causes the RIP control section **58** to generate the raster data, and causes the printer control section **61** to perform printing. Specifically, first, the job control section **55** transmits the JDF of the print job to the JDF analysis section **56**, and outputs a JDF conversion request to convert the JDF to the JDF analysis section **56**.

The JDF analysis section **56** acquires the JDF and the JDF conversion request from the job control section **55**. The JDF analysis section **56** interprets the description of the JDF and determines the vendor (supplier) of the application **12** having generated the JDF. Here, the determination of the vendor of the application **12** having generated the JDF is substantially equivalent to the determination of the rendering engine by which it is assumed that the print job is rendered.

The JDF analysis section **56** converts the JDF into the "DFE inside job attribute" that can be handled by the DFE **32** based on a method using a conversion table **64** provided by a vendor of the application **12** basis. The "DFE inside job attribute" is an example of the claimed "apparatus setting information". Namely, regarding the DFE **32** generated by the vendor "C", the JDF analysis section **56** converts not only the JDF generated by the application of the vendor "C" but also the JDF generated by the application of the vendor "B" or "C" into the "DFE inside job attribute" that is handled by the DFE **32** of the vendor "C".

Further, when generating the "DFE inside job attribute", the JDF analysis section **56** sets the "RIP control mode" to the "DFE inside job attribute". Details of the "RIP control mode" are described below. The "RIP control mode" includes a "Page Mode" and a "Sheet Mode". Here, it is assumed that which of the "Page Mode" and a "Sheet Mode" corresponds to the print job is known in advance. Therefore, when the vendor of the application **12** that generated the JDF is determined, it is also possible to determine the "RIP

control mode". In this embodiment, it is assumed that the DFE **32** recognizes that the setting of the collective printing of the print job is "page Mode" (i.e., the default is "Page Mode").

The job control section **55** that acquires the "DFE inside job attribute" as described above converts the "DFE inside job attribute" and the PDL into the "RIP Parameter List", and outputs the print job in the form of the "RIP Parameter List" to the RIP control section **58**. The "RIP Parameter List" is a set of information that is necessary to perform a RIP process in the RIP engine **59**. The job control section **55** determines an instruction of the RIP process to the RIP engine **59** based on the information of the "RIP Parameter List". This command is called a "RIP command".

In this embodiment, a specific command is extracted from the PDL, and the specific command is reflected in the "RIP Parameter List". The generation of the "RIP Parameter List" is described below.

The "RIP Parameter List" also includes the "RIP control mode". The RIP control section **58** controls the RIP engine **59** in accordance with the "RIP control mode". Accordingly, the sequence is determined based on the "RIP mode".

The "Page Mode" refers to a mode in which the RIP process is operated (instructed) on a page basis and raster data collected into one page is generated. The "Sheet Mode" refers to a mode in which the RIP process is performed on each part (corresponding to one page before having been collected) in one page where plural pages are already collected and the raster data are generated.

The RIP section **57** includes the RIP control section **58** and the RIP engine **59**, and generates the raster data by using the RIP control section **58** and the RIP engine **59**. The RIP control section **58** analyzes the information of the "RIP Parameter List", and determines the RIP engine **59** to be used from among plural RIP engines **59**. The determination of the RIP engine **59** may be based on one or more items of the "RIP Parameter List" or may be based on the RIP engine identification information explicitly described in the "RIP Parameter List". For example, the RIP engine **59** is determined based on the description "xmlns:A="www.aaa.com/schema/aaa" or "xmlns:B="www.bbb.com/schema/bbb" in the "RIP Parameter List". Further, when the job control section **55** explicitly describes the RIP engine identification information in the "RIP Parameter List", the RIP control section **58** selects the RIP engine that is indicated in the RIP engine identification information. The RIP control section **58** refers to the "RIP Parameter List", and transmits the RIP command to the selected RIP engine **59**.

Further, the RIP control section **58** refers to the "RIP Parameter List". When the "RIP control mode" is the "Sheet Mode", the RIP control section **58** outputs the RIP command, in accordance with the "Sheet Mode", to the RIP engine **59**. By doing this, the difference in print jobs can be overcome (compensated for).

The RIP engine **59** is a rendering engine to generate raster data by performing rasterization based on the RIP commands.

The image storage section **60** is a storage means to store the generated raster data. The image storage section **60** is mounted in, for example, the auxiliary storage device **323**. The image storage section **60** may be mounted in a storage device on a network.

The printer control section **61** is connected to the printers **31**, so that printing is performed by reading the raster data stored in the image storage section **60** and transmitting the raster data to the printers **31**. Further, the printer control section **61** performs the finishing process based on the "Finishing information" acquired from the job control section **55**.

Determination of JDF and Vendor of the Application Having Generated JDF

The JDF is described in Extensible Markup Language (XML). The XML is a standard of a structured text to structure a document by adding meanings to tags.

FIGS. **6**A through **6**C illustrate examples of parts of JDF descriptions. It is assumed that the JDF in FIG. **6**A is generated by the application **12** of the vendor "C". In JDF, a content of the instruction to print job is described.

The description "JDF xmlns="http://eee.CIP4.org/JDF-SChema_1_1"" denotes the CIF4-compliance JDF ticket.

The description "xmlns:C="www.ccc.com/scheme/ccc"" denotes a definition of an extended JDF tag in which a print supplier/vendor who is not CIF4-compliant has uniquely extended. In this example, all the tags which start from "C:" in the JDF are the extended tags.

The description "ResourcePool" defines a set of attributes to realize printing.

The description "LayoutPrepareationParama" is one of the attribute defined in the "ResourcePool", and defines attributes related to printing.

The description "ResourceLinkPool" defines a set of references to the attributes commonly used in the "ResourcePool" corresponding to a specific range when attributes differ in the specific range such as between pages in a job.

The description "ComponentLink" is one definition of references in the "ResourceLinkPool", and designates the reference of attributes related to outputs and the information of the outputs.

The description "Amount" designates the number of prints.

The description "Rotate" designates the rotation angle of an image.

FIG. **6**B illustrates an example of the JDF of vendor "A" and extended definition. FIG. **6**C illustrates an example of the JDF of vendor "B" and extended definition. As the description "xmlns:A="www.aaa.co,/schema/aaa"" in FIG. **6**B, all the tags which start from "A:" are extended tags of the vendor "A". Similarly, as the description "xmlns:B="www.bbb.co,/schema/bbb"" in FIG. **6**C, all the tags which start from "B:" are extended tags of the vendor "B". The description of the JDF of the vendor "D" is herein omitted.

Therefore, by referring to those descriptions in the JDF, the JDF analysis section **56** can identify the vendor of the application **12** that generated the JDF. In accordance with the vendors of the applications **12**, by using the conversion table **64**, the JDF can be converted into the "DFE inside job attribute" that can be handled by the DFE **32** of the vendor "C".

Generation of the DFE Inside Job Attribute

The generation of the "DFE inside job attribute" is described with reference to FIGS. **7**A through **8**C. Here, the DFE **32** is generated or is thought to be generated by the vendor "C", where the vendor "C" corresponds to the "own company" for the DFE **32**. FIGS. **7**A through **7**C illustrate an examples of the conversion table **64**. FIGS. **8**A through **8**C illustrate an example of the generation of the "DFE inside job attribute". The JDF analysis section **56** converts the JDF into the "DFE inside job attribute" by using the conversion table **64** of the vendor (the RIP engine that is assumed to process the print job) of the application **12** that generated the JDF. When it is not possible to determine the vendor of the application **12** that generated the JDF, the JDF is converted

into the "DFE inside job attribute" by using all the conversion tables. In this case, the "DFE inside job attributes" corresponding to all the RIP engines are generated.

FIG. **7**A illustrates an example conversion table for the vendor "C". In the conversion table **64** for the vendor "C", the attribute value of the attribution name called "Amount" corresponds to the item value of the item name called "circulation", and the attribute value of the attribution name called "Rotate" corresponds to the item value of the item name called "Rotation".

As the conversion method, as illustrated in FIGS. **8**A through **8**C, the conversion table **64** in which the attribute in tag of the JDF corresponds to the item of the "DFE inside job attribute" is referred to, and the corresponding attribute value of the JDF is allocated as the item value of the "DFE inside job attribute".

The JDF analysis section **56** stores in advance not only the conversion table for the vendor "C" but also the conversion tables for the vendors "A" and "B". FIGS. **7**B and **7**C illustrate the conversion tables **64** for the vendors "B" and "C", respectively. The JDF analysis section **56** detects the description designating the extended tag from the JDF as describe above, determines the vendor of the application, and uses the conversion table **64** corresponding to the vendors.

In the cases of the JDFs of the vendors "A" and "B", the conversion can be performed in the same manner. In the conversion table **64** for the vendor "A", the attribute value of the attribution name called "A:Amount" corresponds to the item value of the item name called "circulation", and the attribute value of the attribution name called "A:Rotate" corresponds to the item value of the item name called "Rotation". In the conversion table **64** for the vendor "B", the attribute value of the attribution name called "B:DeliveryAmount" corresponds to the item value of the item name called "circulation", and the attribute value of the attribution name called "B:Rotate" corresponds to the item value of the item name called "Rotation". Further, in the conversion table **64** for the vendor "B", only when the attribute value of the attribute name called "B:AlternateRotation" is "false", the rotation becomes effective. Therefore, when it is determined that the JDF of the vendor "A" or "B", the "DFE inside job attribute" can be generated similar to the case of the JDF for the vendor "C".

When it is determined that the format of the print job in the collective printing is generated by the application **12** of the vendor other than the own vendor (vendor "C"), the JDF analysis section **56** sets the "Sheet Mode" to the item of the "RIP control mode" of the "DFE inside job attribute". On the other hand, when it is determined that the application **12** is generated by the own vendor (vendor "C") or the format of the print job in the collective printing is generated by the application **12** of the same vendor (vendor "C"), the JDF analysis section **56** sets the "Page Mode" to the item of the "RIP control mode" of the "DFE inside job attribute". By doing this, the RIP control section **58** can control the RIP command to be output to the RIP engine **59** in accordance with the "RIP control mode".

FIG. **9** illustrates an example of the "DFE inside job attribute". The "DFE inside job attribute" is mainly divided into "job information" which is related to job execution, "Edit information" which is related to the raster data, and "Finishing information" which is related to the finishing process.

The Job information includes an item "circulation" which designates the circulation.

An item "direction information" in the "Edit information" designates a printing direction.

An item "print surface information" in the "Edit information" designates a print surface.

An item "rotation" in the "Edit information" designates a rotation angle of a page.

An item "enlarge/reduce" in the "Edit information" designates enlarge or reduce and a magnification ratio.

An item "image position: offset" in the "Edit information" designates an offset of an image.

An item "image position: positional adjustment information" in the "Edit information" designates a positional adjustment of an image.

An item "layout information: custom imposition layout" in the "Edit information" designates the layout of a custom surface.

An item "layout information: No. of pages" in the "Edit information" designates the number of pages for sheets of paper.

An item "layout information: imposition information" in the "Edit information" designates the information related to a surface arrangement.

An item "layout information: page order information" in the "Edit information" designates the information related to an order of pages to be printed.

An item "layout information: creep position adjustment" in the "Edit information" designates the information related to an adjustment of a creep position.

An item "margin information" in the "Edit information" designates the information related to a margin for a fit box and a gutter.

An item "crop mark information: center crop mark information" in the "Edit information" designates the information related to a center crop mark information.

An item "crop mark information: corner crop mark information" in the "Edit information" designates the information related to a corner crop mark information.

An item "Collate information" in the "Finishing information" designates the information indicating whether to print on a page basis or on a document basis when multiple copies of a document are printed.

An item "stapling/binding information" in the "Finishing information" designates the information related to stapling/binding.

An item "punching information" in the "Finishing information" designates the information related to punching.

An item "creasing information" in the "Finishing information" designates the information related to creasing.

An item "trimming" in the "Finishing information" designates the information relate to trimming.

An item "output tray information" in the "Finishing information" designates the information related to an output tray information.

An item "input tray" in the "Finishing information" designates the information related to an input tray.

An item "cover sheet information" in the "Finishing information" designates the information related to a cover sheet.

Further, as illustrated in FIG. **9**, in the "DFE inside job attribute", the "RIP control mode" is set. As the "RIP control mode", the "Page Mode" or the "Sheet Mode" is set. In a case of a dummy JDF, it is assumed that the "Page Mode" is set as the "RIP control mode".

Example of RIP Parameter List

FIG. **10** illustrates an example of the "RIP Parameter List".

An item "input/output data type information" designates a type of input/output data (the input/output data are designated in not only PDL but also a text file, an image data such as in JPEG, etc.).

An item "input/output data read/write position designation method information" designates a designation method of designating an offset of input/output data (read/write position). For example, it is possible to designate as "from designated position", "from the current position", "form the end", etc.

An item "input/output data read/write positional information" designates the current processing position of the input/output data.

An item "input/output data read/write execution mode information" is the information which designates an execution mode. For example, "READ", "WRITE", "READ_WRITE", etc., is set.

An item "unit information (dimension)" designates the unit used in the "RIP Parameter List". For example, a unit such as "mm", "inch", "pel", "point", etc. is designated.

An item "input/output data compression method information" designates a compression method of input/output data. For example, "UNCOMPRESSED", "PACKBITS", etc., is designated.

An item "RIP control mode" designates a control mode in collective printing. For example, the "Page Mode" or the "Sheet Mode" is designated.

An item "input/output image information section" includes items "information related to output image", "information related to input image", and "information related to handling of an image".

An item "image format type" designates a format type of an output image. For example, a type "raster" is designated.

An item "image format dimension" designates the dimensions of an output image format.

An item "image format resolution" designates the resolution of an output image format.

An item "image position" designates the position of an output image.

An item "color separation information" designates color separation (color decomposition). For example, "k", "cmyk", "separation", etc., is designated.

An item "color plane fit policy information" designates a development method of a color plane.

An item "plane shift information" designates a shift amount of a color plane.

An item "image format color bit number" designates the color bit number of an output image format.

An item "image direction information" designates a direction of a page of an output image.

An item "imaging (image formation) positional information" designates a positional information of a crop area.

An item "imaging size information" designates size information of the crop area.

An item "imaging method information" designates a clipping policy.

An item "color ICC information" designates the information related to a color ICC profile.

An item "font substitution information" designates the information related to substitution of a font.

An item "imaging base point information" designates an imaging original point. For example, "center", "right-upper", etc., is designated.

An item "flat K black information" designates the information related to flat K black.

An item "rendering information" designates the information related to rendering (rasterizing).

An item "image format type" designates a format type of an input image. For example, "raster", etc., is designated.

An item "image format dimension" designates the dimension of a input image format.

An item "image format resolution" designates the resolution of the input image format.

An item "image position" designates the position of an input image.

An item "input data" designates the input data.

An item "page range information" designates a page number.

An item "color ICC information" designates the information related to color ICC profile.

An item "scaling offset information" designates an offset of an enlarging/reducing algorithm. For example, "horizontal direction offset", "vertical direction offset", etc., is designated.

An item "object area information" designates the width and the height of an object area.

An item "halftone information" designates an offset of a half tone. For example, "horizontal direction offset", "vertical direction offset", etc., is designated.

An item "scaling algorithm information" designates a scaling method.

An item "information related to the PDL" designates a data area, size information, and data layout method.

An item "data area" designates the area information stored in the PDL. Font information, information of the number of pages, etc., are included in the PDL that exists in the data area.

An item "size information" designates the size of the PDL.

An item "data layout method" designates the layout method of data. For example, "little endian", "big endian", etc., is designated.

Detection of Specific Command and Update of RIP Parameter List

FIG. **11** illustrates an example of the specific command conversion table **63**. The specific command conversion table **63** is an example of claimed "description conversion table". In the specific command conversion table **63**, the "specific command" is associated with the "common PDL" and the "DFE inside job attribute". Further, the specific commands differ depending on the applications. Therefore, the specific command conversion table **63** is generated on an application basis (i.e., for each of the RIP engines).

The generation of the specific command conversion table **63** is described. The specific command is detected as a PDL command (description) in which an error occurs when the PDL and the "DFE inside job attribute" is rendered by the RIP engine **59** that is not assumed to perform rendering. Further, for example, the specific command may be detected by a person of the vendor "C" to determine which types of specific commands are included in the applications **12**.

It is possible to estimate what kind of a common PDL and a PDL inside specific attribute does the detected specific command mean by rendering the PDL and the "DFE inside job attribute" using the RIP engine that is assumed to perform rendering.

The "common PDL" refers to a command which is common among the RIP engines of the vendors. On the other hand, the "PDL inside specific attribute" may be referred to a print setting that is not included in a general print setting. Such setting may be already included in the JDF, and may

be treated as a specific (optional) print setting in applications **12**. However, in any case, when the specific command operates in the raster data, etc., it becomes possible to convert the specific command into the "DFE inside job attribute". Further, it is also possible determine that it is not necessary to convert a specific command into the "DFE inside job attribute" when the specific command corresponds to the attribute information that is not supported by the RIP engines of the other vendors (that does not influence the raster data).

The specific command conversion table **63** is generated by associating the detected command with at least one of (or both) the common PDL and the PDL inside specific attribute which are searched as described above.

In FIG. **11**, the specific command "%% A_CropMark: Center" is associated with the common PDL "-" and the PDL inside specific attribute "center crop mark: ON". The symbol "-" herein denotes that there is no corresponding general PDL command available. This specific command is deleted from the input PDL. On the other hand, the "center crop mark: ON" denotes a center mark printing, which is, basically, a print setting set by the JDF. This print setting includes an attribute and an attribute value. Herein, both the attribute and the attribute value are called "attribute information". The attribute information that is set in the JDF can be set in an item corresponding to the "RIP Parameter List". Further, needless to say, the specific command includes the attribute and the attribute value.

Therefore, by converting a specific command into the common PDL and the PDL inside specific attribute, it becomes possible to delete the specific command and extract the common PDL or the PDL inside specific attribute to perform rendering.

Further, in FIG. **11**, the specific command "2B_imposition" is associated with the common PDL "-" and the PDL inside specific attribute "Imposition: 2-up". The symbol "-" is described above. On the other hand, the "Imposition: 2-up" denotes collective printing two pages, and which is, basically, a print setting set by the JDF.

FIG. **12** schematically illustrates an example of generating the "RIP Parameter List" according to an embodiment.

I.: When the job control section **55** outputs a JDF in a vender "A" format to the JDF analysis section **56**, the JDF analysis section **56** generates the "DFE inside job attribute".

II.: The job control section **55** generates the "RIP Parameter List" based on the PDL and "DFE inside job attribute". In this case, the "RIP Parameter List" may be generated according to a method similar to a related-art method.

III.: The PDL conversion section **62** detects a specific command from the PDL, and converts the specific command into the common PDL and the PDL-inside specific attribute. In this case, both the common PDL and the PDL-inside specific attribute are not always generated from the specific command. Namely, there may exist a case where the specific command is converted into only one of the common PDL and the PDL-inside specific attribute (or the specific command cannot be converted).

IV. The job control section **55** updates the "RIP Parameter List" by using the common PDL and the PDL-inside specific attribute. The common PDL is a common setting in the applications of all the vendors. Therefore, the common PDL is set in a predetermined item of the "RIP Parameter List". Further, the job control section **55** sets the PDL-inside specific attribute to be an item corresponding to the "RIP Parameter List". It is already known how the PDL-inside specific attribute behaves (operates) in the raster data, etc. Therefore, for example, a table in which the PDL-inside specific attribute is associated with the item of the "RIP Parameter List" is generated in advance. Due to the above, it becomes possible for the "RIP Parameter List" to provide an operation similar to that of the specific command.

In the method of FIG. **12**, the "RIP Parameter List" is generated based on the PDL and the "DFE inside job attribute". Therefore, it become possible to control the change of the processing procedure of the job control section **55**.

FIG. **13** illustrates an example "RIP Parameter List" after update. There is attribute information "center crop mark: ON" added to an item "information related to output image" of the "input/output image information section". Note that FIG. **3** is provided for explanation purposes only. As long as the information "center crop mark: ON" is included in the "RIP Parameter List", it is not necessary that the "center crop mark: ON" is added as the attribute information to the "RIP Parameter List", so that the "RIP Parameter List" is updated. Another example of the generation of the RIP Parameter List using the common PDL and the PDL-inside specific attribute

FIG. **14** schematically illustrates another example of generating the "RIP Parameter List" according to an embodiment.

I.: When the job control section **55** outputs a JDF in a vender "A" format to the JDF analysis section **56**, the JDF analysis section **56** generates the "DFE inside job attribute".

II.: The PDL conversion section **62** detects a specific command from the PDL, and converts the specific command into the common PDL and the PDL-inside specific attribute. In this case, both the common PDL and the PDL-inside specific attribute are not always generated from the specific command. Namely, there may exist a case where the specific command is converted into only one of the common PDL and the PDL-inside specific attribute.

III. The job control section **55** generates the "RIP Parameter List" by using the PDL, the common PDL, and the "DFE inside job attribute". In related art, the "RIP Parameter List" is generated based on the PDL and the "DFE inside job attribute", and it is possible to regard the common PDL as a part of the PDL. Therefore, it is possible to generate the "RIP Parameter List" based on the PDL, the common PDL, and the "DFE inside job attribute".

IV. The job control section **55** sets the PDL-inside specific attribute to be an item corresponding to the "RIP Parameter List". Due to the above, it becomes possible for the "RIP Parameter List" to provide an operation similar to that of the specific command.

In the method of FIG. **14**, the common PDL is extracted first, and the "RIP Parameter List" is generated. Therefore, it becomes possible to reduce the change relative to the "RIP Parameter List".

Based on the processes described above, a setting of the print job included in the specific command can be extracted and set to an appropriate item of the "RIP Parameter List".

Selection of RIP Engine

The "RIP Parameter List" generated by the job control section **55** according to an embodiment can cause the RIP engine of the vendor "A", the RIP engine of the vendor "B", and RIP engine of the vendor "C" to perform rendering. This is because the conversion table **64** and the specific command conversion table **63** are provided for each of the RIP engines. Therefore, the RIP control section **58** can select any RIP engine **59**. Further, the RIP control section **58** may select the RIP engine **59** based on, for example, the following method.

i) The RIP engine **59** that is set by a user is used (selected).

ii) The RIP engine **59** is used corresponding to the conversion table **64** with which the conversion from the JDF into the "DFE inside job attribute" is performed in a good manner.

In the method of the case "i)", the RIP engine, which is set by a user via the UI control section **54** or a network, is used. However, when there exists a setting to designate the RIP engine **59** in the JDF, the designated RIP engine **59** may be used.

Whether the conversion in the case "ii)" is performed "in a good manner" is determined by the JDF analysis section **56** by comparing between the items of the "DFE inside job attributes", which are converted from the JDF, and the attributes of the JDF. More specifically, the JDF analysis section **56** compares between the values of the attributes of the JDF and the corresponding values in the items of the "DFE inside job attributes" one by one. The smaller the difference before and after the conversion, the higher is the score value given by the JDF analysis section **56**. By summing the score values, the score values of the RIP engines are acquired. The greater the score value, the better the conversion is. Therefore, JDF analysis section **56** selects the RIP engine **59** having the greatest score value.

When the method is used where the RIP engine **59** is selected based on the score values, it is more likely to occur when the RIP engine of the vendor "A" is selected for the print job that is generated by the application **12** of the vendor "A", the RIP engine of the vendor "B" is selected for the print job that is generated by the application **12** of the vendor "B", and the RIP engine of the vendor "C" is selected for the print job that is generated by the application **12** of the vendor "C". However, it is possible to automatically select an appropriate RIP engine **59** even when a print job, which is generated by an unknown application **12**, is input or even when the vendor of the application **12** is wrongly determined.

Operation Procedure

FIG. **15** is a sequence diagram illustrating an example procedure of rendering the print job by the DFE **32** according to an embodiment.

Step S**1**: The application **12** transmits a print job (JDF and PDL) to the DFE **32**. The PDL includes a specific command. Therefore, the "specific PDL" is described in FIG. **15**.

Step S**2**: The job receiving section **51** outputs the print job (JDF and PDL) to the system control section **52**.

Step S**3**: The system control section **52** outputs the print job to the job control section **55**. When the DFE **32** sets so as to store the print job into the job data storage section **53**, the system control section **52** stores the print job into the job data storage section **53**.

Step S**4**: The job control section **55** outputs the JDF and a JDF conversion request to the JDF analysis section **56**.

Step S**5**: The JDF analysis section **56** identifies the application that has generated the JDF, and generates the "DFE inside job attribute" by using the conversion table **64** for the RIP engine that is assumed to perform rendering by the application.

Step S**6**: The JDF analysis section **56** outputs the "DFE inside job attribute" to the job control section **55**.

Step S**7**: The job control section **55** generates the "RIP Parameter List" by using the "DFE inside job attribute" and the PDL. In this step, the specific command of the PDL is not reflected in the "RIP Parameter List".

Step S**8**: The job control section **55** outputs a conversion request along with the PDL (specific command) to the PDL conversion section **62**.

Step S**9**: The PDL conversion section **62** converts the specific command of the PDL into the common PDL and the PDL-inside specific attribute by using the specific command conversion table **63**.

Step S**10**: The PDL conversion section **62** outputs the common PDL and the PDL-inside specific attribute to the job control section **55**.

Step S**11**: The job control section **55** updates the "RIP Parameter List" by using the common PDL and the PDL-inside specific attribute.

The following process differs depending on whether the "RIP control mode" is the "Page Mode" or the "Sheet Mode". First, the process in case of the "Page Mode" is described.

Step S**12-1**: The job control section **55** outputs the "RIP Parameter List" to the RIP control section **58**.

Step S**13-1**: The RIP control section **58** initializes the RIP engine **59**.

Step S**14-1**: The job control section **55** sends an RIP execution request to the RIP control section **58**.

Step S**15-1**: The RIP control section **58** outputs the RIP command in place of the job control section **55**. When the "RIP control mode" is the "Page Mode", the RIP control section **58** outputs the RIP command in a sequence appropriate for the "Page Mode".

Step S**16-1**: The RIP engine **59** performs rasterization.

Step S**17-1**: The RIP engine **59** stores the raster data into the image storage section **60**.

Next, the process in case of the "Sheet Mode" is described.

Step S**12-2**: The job control section **55** outputs the "RIP Parameter List" to the RIP control section **58**.

Step S**13-2**: The RIP control section **58** initializes the RIP engine **59**.

Step S**14-2**: The job control section **55** sends the RIP execution request to the RIP control section **58**.

Step S**15-2**: The RIP control section **58** outputs the RIP commands in a sequence in accordance with the "Sheet Mode" when the "RIP control mode" is the "Sheet Mode".

Step S**16-2**: The RIP engine **59** performs rasterization.

Step S**17-2**: The RIP engine **59** stores the raster data into the image storage section **60**.

Therefore, there is no difference in the operation of the job control section **55** regardless of whether the "RIP control mode" is the "Page Mode" or the "Sheet Mode", so that the job control section **55** always operates based on the "Page Mode". The RIP control section **58** can determine the difference between the "Page Mode" or the "Sheet Mode" based on the "RIP control mode", and absorb the difference between the "Page Mode" or the "Sheet Mode".

Step S**18**: The job control section **55** outputs the "Finishing information" along with a print execution request to the printer control section **61**. This timing may be before or after the generation of the raster data.

Step S**19**: Upon the receipt of the print execution request, the printer control section **61** determines the raster data to be in the image storage section **60**, and performs printing.

As described above, the DFE **32** according to an embodiment can generate the "RIP Parameter List" including the print setting (attribute information) that does not include a specific command and is extracted from a specific command even when the PDL of the print job generated by the application **12** of the vendor "A" includes the specific command of the vendor "A". Therefore, it becomes possible to perform printing by not only the RIP engine of the vendor "A" but also the RIP engines of the vendors "B" and "C". For example, in a case where all the RIP engines of the

vendors "A", "B", and "C" support the PostScript language, even when the PDLs of the applications include respective specific commands, it becomes possible for any of the RIP engines **59** to perform printing.

Second Embodiment

In the first embodiment, a specific command is converted into the common PDL and the PDL-inside specific attribute by using the specific command conversion table **63**. In this embodiment, the DFE **32** is described that uses a function called Pre-RIP, which is provided by the RIP section **57**, so as to generate the common PDL and the PDL-inside specific attribute.

Here, the term "Pre-RIP" refers to a process where the job control section **55** outputs a PDL command to the RIP control section **58** (or the RIP engine **59**) without actual rendering, and acquires the attribute information (the attributes and the attribute values). The attributes that are transmitted by the RIP control section **58** are an example of the claimed "print setting information". By doing this, it becomes possible for the job control section **55** to acquire the attribute information designated by the PDL, and determine whether the RIP engine **59** corresponds to the PDL commands.

In this embodiment, by using the structure of the Pre-RIP, a specific command is detected and the common PDL or the PDL-inside specific attribute is generated based on the acquired attribute information. It does not matter, however, even when neither of the common PDL nor the PDL-inside specific attribute may be generated.

FIG. **16** is an example functional block diagram of the DFE **32** according to this embodiment. Here, the same reference numerals are used to describe the same or equivalent elements as those in FIG. **5**, and only main elements in this embodiment may be described.

The configuration of this embodiment described herein similar to that of the first embodiment except that the PDL conversion section **62** does not have the specific command conversion table **63**.

Conversion into the Common PDL and the PDL-Inside Specific Attribute by the Pre-RIP

FIG. **17** schematically illustrates an example of the conversion from the specific command into the common PDL and the PDL-inside specific attribute by the Pre-RIP. The job control section **55** (PDL conversion section **62**) outputs the PDL along with a Pre-RIP request to the RIP control section **58**. By doing this, the RIP control section **58** performs the Pre-RIP and transmits the result to the PDL conversion section **62**.

I. The RIP control section **58** outputs the PDL commands to the RIP engine **59** in a command basis (i.e., outputs the commands one by one or on a section basis, each section having meaning such as one function). The PDL commands includes respective attributes and attribute information.

The case of the specific command "%% A_CropMark:Center" in the first embodiment is exemplarily described. The attribute and the attribute information of the specific command "%% A_CropMark:Center" are as follows:

Attribute . . . A_CropMark

Attribute value . . . Center

II. The RIP engine **59** transmits the respective attribute information (attributes and attribute values) in response to the PDL commands. The RIP engine **59** transmits the following attribute information in response to the specific command "%% A_CropMark:Center".

Attribute . . . Center Crop Mark

Attribute value . . . ON

III. The PDL conversion section **62** determines that the "%% A_CropMark:Center" is the specific command because the received attribute differs from the transmitted attribute. Why such determination is possible is that the Pre-RIP is performed in order to determine the attributes of the PLD commands (to know whether the RIP engine **59** supports the attribute of the PDL) and when the RIP engine **59** supports the attribute of the PDL, the same attribute basically returns.

When the attribute of a PDL command is the same as the attribute acquired by the Pre-RIP, the PDL command can be processed by the RIP engine **59** (because the PDL command is not the specific command). Therefore, the PDL conversion section **62** does not do anything.

IV.: In the case of the specific command, the PDL conversion section **62** sets the received attribute information (attribute and attribute value) into the common PDL and the PDL-inside specific attribute. Here, it is assumed that whether to set into the common PDL or the PDL-inside specific attribute in accordance with the attribute information is determined in advance. The common PDLs are already known. Therefore, a list of the common PDLs may be stored in a table, so that the attribute information other than the common PDLs may be set into the PDL-inside specific attribute. Accordingly, the attribute value "Center Crop Mark: ON" is set into the PDL-inside specific attribute.

When it is determined that the PDL command "%% A_CropMark:Center" is the specific command, the PDL conversion section **62** deletes (removes) the specific command from the PDL because the RIP engine **59** cannot process the specific command.

Selection of the RIP Engine

In this embodiment, the DFE **32** includes the RIP engines of the vendors "A", "B", and "C". In such a case where plural RIP engines **39** are included, the PDL conversion section **62** performs the Pre-RIP by any or all the RIP engines **59**.

When any RIP engine **59** is used, the RIP engine **59** that performs the Pre-RIP is selected similar to the case in the first embodiment where the RIP engine that performs rendering is selected.

i) The RIP engine **59** that is set by a user is used (selected).

ii) The RIP engine **59** is used corresponding to the conversion table **64** with which the conversion from the JDF into the "DFE inside job attribute" is performed in a good manner.

When the Pre-RIP is performed by all the RIP engines, the specific commands corresponding to the RIP engines are identified, and respective common PDLs and the PDL-inside specific attributes are acquired. In this case, the "RIP Parameter List" is generated by using the common PDL and the PDL-inside specific attribute acquired by the Pre-RIP that is performed by the RIP engine to be finally used in rendering (the RIP engine designated by a user or that provides conversion in a good manner).

Operation Procedure

FIG. **18** is a sequence diagram illustrating an example procedure of rendering a print job by the DFE **32** according to this embodiment. The steps **S8** through **S12** differ from those in FIG. **13** in the first embodiment.

Step **S1**: The application **12** transmits a print job (JDF and PDL) to the DFE **32**.

Step S2: The job receiving section **51** outputs the print job (JDF and PDL) to the system control section **52**.

Step S3: The system control section **52** outputs the print job to the job control section **55**. When the DFE **32** sets so as to store the print job into the job data storage section **53**, the system control section **52** stores the print job into the job data storage section **53**.

Step S4: The job control section **55** outputs the JDF and a JDF conversion request to the JDF analysis section **56**.

Step S5: The JDF analysis section **56** identifies the application that has generated the JDF, and generates the "DFE inside job attribute" by using the conversion table **64** for the RIP engine that is assumed to perform rendering by the application.

Step S6: The JDF analysis section **56** outputs the "DFE inside job attribute" to the job control section **55**.

Step S7: The job control section **55** generates the "RIP Parameter List" by using the "DFE inside job attribute" and the PDL. In this step, the specific command of the PDL is not reflected in the "RIP Parameter List".

Step S8: The job control section **55** outputs a conversion request along with the PDL to the PDL conversion section **62**.

Step S9: The PDL conversion section **62** outputs the PDL to the RIP control section **58**.

Step S9-1: The PDL conversion section **62** performs the Pre-RIP on the RIP control section **58** on a command basis. Namely, the RIP control section **58** outputs the PLD commands (attributes and attribute values) to the RIP engine **59**.

Step S9-2: In response to this, the RIP engine **59** transmits the attribute information (attributes and attribute values) to the RIP control section **58**.

Step S10: The RIP control section **58** transmits the attribute information (attributes and attribute values) to the PDL conversion section **62**.

Step S11: When determining that the attribute is changed, the PDL conversion section **62** sets the PDL command, which is output to the RIP control section **58**, into the common PDL or the PDL-inside specific attribute. Further, the PDL conversion section **62** deletes the PDL command, which is output to the RIP control section **58**, from the PDL.

Step S12: The PDL conversion section **62** outputs the common PLD and the PDL-inside specific attribute to the job control section **55**.

Step S13: The job control section **55** updates the "RIP Parameter List" by using the common PDL and the PDL-inside specific attribute. The processes after steps S14-1 and S14-2 are similar to those in the first embodiment. Therefore, the repeated descriptions thereof are herein omitted.

As described above, the DFE **32** can generate the "RIP Parameter List" that does not include a specific command but does include the setting extracted from the specific command similar to the first embodiment without using the specific command conversion table **63**. Therefore, even when the PDL includes a specific command, it becomes possible for any of the RIP engines **59** to perform rendering.

Preferred modification

As described above, preferred embodiments are described. However, it should be noted that the present invention is not limited to the embodiments. Various modifications and replacements may be made without departing from the scope of the present invention.

For example, in FIG. **5**, the DFE **32** includes all functions. However, any of the functions may be implemented in a separated apparatus that is in communication via a network. For example, the RIP engines **59** and the JDF analysis sections **56** of the vendors may be provided on a network accessible from the DFE **32**.

This may also be applied to the image storage section **60** and the job data storage section **53**, so that those sections may be provided on a network accessible from the DFE **32**.

Further, the PDL conversion section **62** may be provided outside the DFE **32**. In this case, the DFE **32** transmits the PDL to the outside PDL conversion section **62**, and acquires the common PDL and the PDL-inside specific attribute from the PDL conversion section **62**.

Although the invention has been described with respect to specific embodiments for a complete and clear disclosure, the appended claims are not to be thus limited but are to be construed as embodying all modifications and alternative constructions that may occur to one skilled in the art that fairly fall within the basic teaching herein set forth.

What is claimed is:

1. An information processing apparatus comprising:

a first drawing data generation unit associated with a first vendor;

a second drawing data generation unit associated with a second vendor, wherein each drawing data generating unit is configured to generate drawing data by using a print job that includes Page Description Language (PDL) print data and Job Definition format (JDF) setting information;

a description detection unit configured to detect a non-standard PDL command specific to the first vendor included in the PDL print data; and

a conversion unit configured to convert the PDL print data, the non-standard PDL command specific to the first vendor, and the JDF setting information into an instruction group executed by the second drawing data generation unit associated with the second vendor.

2. The information processing apparatus according to claim **1**,

wherein the description detection unit is configured to convert the detected non-standard PDL command specific to the first vendor into supported PDL print data, which is supported by the first and second drawing data generation units, and attribute information of the instruction group, and

wherein the conversion unit is configured to convert the PDL print data, the supported PDL print data, the attribute information, and the JDF setting information into the instruction group.

3. The information processing apparatus according to claim **2**, further comprising:

a description conversion table in which the non-standard PDL command specific to the first vendor is associated with at least one of the supported PDL print data and the attribute information,

wherein the description detection unit is configured to detect the non-standard PDL command specific to the first vendor included in the description conversion table from the PDL print data, and convert the non-standard PDL command specific to the first vendor into at least one of the supported PDL print data and the attribute information.

4. The information processing apparatus according to claim **2**,

wherein the first and second drawing data generation units are configured to transmit print setting information when receiving a description of a predetermined unit of the PDL print data, the print setting information being designated by the description, and

wherein the description detection unit is configured to detect the description as the non-standard PDL command specific to the first vendor in a case where the print setting information which is transmitted by the first and second drawing data generation units in response to the receipt of the description of the predetermined unit of the PDL print data, differs from the description, and convert the print setting information, which is transmitted by the first and second drawing data generation units, into at least one of the supported PDL print data and the attribute information.

5. The information processing apparatus according to claim **2**, further comprising:

an apparatus setting information generation unit configured to convert the JDF setting information into apparatus setting information that is handled by the information processing apparatus,

wherein the conversion unit is configured to convert the apparatus setting information, which is converted from the JDF setting information, and the PDL print data into the instruction group,

wherein the description detection unit is configured to detect the apparatus setting information from the non-standard PDL command specific to the first vendor including information that is to be included in the JDF setting information, and

wherein the conversion unit is configured to convert the apparatus setting information which is detected from the PDL print data, and the PDL print data into the instruction group.

6. The information processing apparatus according to claim **5**,

wherein the conversion unit is configured to convert the PDL print data and the apparatus setting information into the instruction group and then update the instruction group by using at least one of the supported PDL print data, which is converted from the non-standard PDL command specific to the first vendor, and the attribute information.

7. The information processing apparatus according to claim **2**,

wherein the non-standard PDL command specific to the first vendor can be processed by the second drawing data generation unit, and

wherein any of the first and second drawing data generation units is configured to execute the instruction group that has been converted from the PDL print data, the supported PDL print data, the attribute information, and the setting information by the conversion unit based on conversion of the non-standard PDL command specific to the first vendor into at least one of the supported PDL print data and the attribute information.

8. An information processing method operable by an information processing apparatus that includes a first drawing data generation unit associated with a first vendor and a second drawing data generation unit associated with a second vendor, wherein each drawing data generating unit is configured to generate drawing data by using a print job that includes Page Description Language (PDL) print data and Job Definition format (JDF) setting information, the method comprising:

detecting a non-standard PDL command specific to the first vendor included in the PDL print data; and

converting the PDL print data, the non-standard PDL command specific to the first vendor, and the JDF setting information into an instruction group executed by the second drawing data generation unit associated with the second vendor.

9. A non-transitory computer-readable medium embodying programmed instructions which, when executed by a processor of an information processing apparatus that includes a first drawing data generation unit associated with a first vendor and a second drawing data generation unit associated with a second vendor, wherein each drawing data generating unit is configured to generate drawing data by using a print job that includes Page Description Language (PDL) print data and Job Definition format (JDF) setting information, direct the processor to:

detect a non-standard PDL command specific to the first vendor included in the PDL print data; and

convert the PDL print data, the non-standard PDL command specific to the first vendor, and the JDF setting information into an instruction group executed by the second drawing data generation unit associated with the second vendor.

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